PROJECT INFORMATION

Project Title	Pre-Engineering - biomass based district heating in support of Forest Health
Brief Description	A pre-engineering study for a biomass-fueled district heating system in support of the Forest Health Sage Steppe restoration project on the Modoc Forest. Project location: City of Alturas. Project proponent: City of Alturas. Deliverables: 1. A Preliminary design of the biomass heat generation facility for district wide heating. 2. A Preliminary design of a heating district distribution system with utilization of existing infrastructure. 3. A fuel cost comparison study for customer conversion. 4. Design alternatives to incorporate the use of combined biomass heat and power generation and existing geothermal wells to augment the district heating system. 5. Identification of overall project needs for phased development: financing requirements for construction and operation, project schedule requirements, permits and licenses, safety plans, development of supplier and customer contracts, recommended ownership and management structure, initial operation and management plan requirements. Project Goals: Implementation of the project design and overall project needs identified by goal 5 above.
Total Requested Amount	75,000.00
Other Fund Proposed	11,000.00
Total Project Cost	86,000.00
Project Category	Pre-Project Due Diligence
Project Area/Size	0
Project Area Type	Acres
Have you submitted to SNC this fiscal year?	No
Is this application related to other SNC funding?	No

Project Results
Appraisal

Project Purpose	Project Purpose Percent
Water Quality	

County
Modoc

Sub Region
North

PROJECT CONTACT INFORMATION

Name	Mr. Chester Robertson,
Title	County Administrative Officer
Organization	City of Alturas
Primary Address	City of Alturas, 200 West North Street, , Alturas, CA, 96101
Primary Phone/Fax	530-233-7660 **Ext.**
Primary Email	chesterrobertson@co.modoc.ca.us

PROJECT LOCATION INFORMATION

Project Location	
Address:	City of Alturas, 200 West North Street, , Alturas, CA, 96101 United States
Water Agency:	City of Alturas
Latitude:	41.459195
Longitude:	-120.53100
Congressional District:	n/a
Senate:	n/a
Assembly:	n/a
Within City Limits:	Yes
City Name:	Alturas

ADDITIONAL INFORMATION

Grant Application Type

Grant Application Type: **Category Two Pre-Project Activities**
Grant Application Type: **Category Two Pre-Project Activities**

PROJECT OTHER CONTACTS INFORMATION

Other Grant Project Contacts

Name:	Mr. Chester Robertson,
Project Role:	Day-to-Day Responsibility
Phone:	5307081399
Phone Ext:	
E-mail:	chesterrobertson@co.modoc.ca.us

UPLOADS

The following pages contain the following uploads provided by the applicant:

Upload Name
Completed Application Checklist
Table of Contents
Full Application Form
Authorization to Apply or Resolution
Narrative Descriptions
Detailed Budget Form
Restrictions/Agreements
Regulatory Requirements or Permits
CEQA Documentation
NEPA Documentation
Letters of Support
Long Term Management Plan
Project Location Map
Parcel Map Showing County Assessors Parcel Number

Topographic Map
Photos of the Project Site
Photos of the Project Site
Photos of the Project Site
Photos of the Project Site
Photos of the Project Site
Photos of the Project Site
Photos of the Project Site
Photos of the Project Site
Photos of the Project Site

To preserve the integrity of the uploaded document, headers, footers and page numbers have not been added by the system.

Appendix B1
Full Application Checklist

Project Name: Pre-engineering Study: City of Alturas biomass-based district heating in support of the Forest Health Sage Steppe Project

Applicant: City of Alturas

Please mark each box: check if item is included in the application; mark "N/A" if not applicable to the project. "N/A" identifications must be explained in the application. Please consult with SNC staff prior to submission if you have any questions about the applicability to your project of any items on the checklist. All applications must include a CD including an electronic file of each checklist item, if applicable. The naming convention for each electronic file is listed after each item on the checklist. (Electronic File Name = EFN: "naming convention". file extension choices)

Submission requirements for all Category One and Category Two Grant Applications

1. ☒ Completed Application Checklist *(EFN: Checklist.doc,.docx,.rtf, or .pdf)*

2. ☒ Table of Contents *(EFN: TOC.doc,.docx,.rtf, or .pdf)*

3. ☒ Full Application Project Information Form *(EFN: SIform.doc, .docx, .rtf, or .pdf)*

4. ☒ Authorization to Apply or Resolution *(EFN: authorization.doc, .docx, .rtf, or .pdf)*

5. ☒ Narrative Descriptions - Submit a single document that includes each of the following narrative descriptions *(EFN: Narrative.doc, .docx, .rtf)*
   a. ☒ Detailed Project Description (5,000 character maximum)
      - ☒ Project Description including Goals/Results, Scope of Work, Location, Purpose, etc.
      - ☒ Project Summary
      - ☒ Environmental Setting
   b. ☒ Workplan and Schedule (1,000 character maximum)
   c. ☒ Restrictions, Technical/Environmental Documents and Agreements(1,000 character maximum)
   d. ☒ Organizational Capacity(1,000 character maximum)
   e. ☒ Cooperation and Community Support (1,000 character maximum)
   f. ☒ Long Term Management and Sustainability (1,000 character maximum)
   g. ☒ Performance Measures (1,000 character maximum)

6. Supplemental and Supporting documents
   a. ☒ Detailed Budget Form (EFN: Budget.xls, .xlsx)
   b. Restrictions, Technical/Environmental Documents and Agreements, as applicable
      - ☒ Restrictions / Agreements *(EFN: RestAgree.pdf)*
      - ☒ Regulatory Requirements / Permits *(EFN: RegPermit.pdf)*

- ☒ California Environmental Quality Act (CEQA) documentation *(EFN: CEQA.pdf)*
- ☒ National Environmental Policy Act (NEPA) documentation *(EFN: NEPA.pdf)*

c. Cooperation and Community Support
   - ☒ Letters of Support *(EFN: LOS.pdf)*

d. Long-Term Management and Sustainability
   - ☒ Long-Term Management Plan *(EFN: LTMP.pdf)*

e. Maps and Photos
   - ☒ Project Location Map *(EFN: LocMap.pdf)*
   - ☒ Parcel Map showing County Assessor's Parcel Number(s) *(EFN: ParcelMap.pdf)*
   - ☒ Topographic Map *(EFN: Topo.pdf)*
   - ☒ Photos of the Project Site *(10 maximum) (EFN: Photo.jpg, .gif)*

f. Additional submission requirements <u>for Conservation Easement Acquisition applications only</u> N/A Project is not a Conservation Easement Acquisition.
   - N/A Acquisition Schedule *(EFN: acqSched.doc,.docx,.rtf,.pdf)*
   - N/A Willing Seller Letter *(EFN: WillSell.pdf)*
   - N/A Real Estate Appraisal *(EFN: Appraisal.pdf)*
   - N/A Conservation Easement Language *(EFN: CE.pdf)*

g. Additional submission requirements <u>for Site Improvement / Restoration Project applications only</u> N/A Project is not a Site Improvement/Restoration
   - N/A Land Tenure Documents – attach only if documentation was not included with Pre-application *(EFN: Tenure.pdf)*
   - N/A Site Plan *(EFN: SitePlan.pdf)*
   - N/A Leases or Agreements *(EFN: LeaseAgmnt.pdf)*

I certify that the information contained in the Application, including required attachments, is accurate.

_____ _____

Signed *(Authorized Representative)* Date

_____

Name and Title *(print or type)*

City of Alturas Biomass-based District Heating Proposal
TABLE OF CONTENTS

Appendix B2

Note: You can only save data in this form if you are using Adobe Acrobat Pro. If you are not using Adobe Acrobat Pro, click here for a Microsoft Word version of this form, which you can fill out and save.

SIERRA NEVADA CONSERVANCY
PROPOSITION 84 - PROJECT INFORMATION FORM

Rev. August 2011

PROJECT NAME

Pre-engineering Study: City of Alturas biomass-based district heating in support of the Forest Health Sage Steppe Project

APPLICANT NAME *(Legal name, address, and zip code)*

City of Alturas
200 West North Street
Alturas, CA 96101

PERSON WITH FISCAL MANAGEMENT RESPONSIBILITY FOR GRANT CONTRACT/INVOICING

Name and title – type or print	*Phone*	*Email Address*
☒Mr. Chester Robertson, Public Works Director	530-233-2377	crobertson@cityofalturas.org
☐Ms.		

COUNTY ADMINISTRATOR OR PLANNING DIRECTOR CONTACT INFORMATION *(At least one entry Is required)*

Name: Chester Robertson, County Administrative Officer 530-233-2377

Email address: crobertson@cityofalturas.org

Name: Kim Hunter, Planning Director 530-233-6406

Email address:Kimhunter@co.modoc.ca.us

NEAREST PUBLIC WATER AGENCY (OR AGENCIES) CONTACT INFORMATION *(At least one entry Is required)*

Name: City of Alturas *Phone Number: 233-2377*

Email address: crobertson@cityofalturas.org

Name: *Phone Number:*

Email address:

Please identify the appropriate project category below and provide the associated details *(Choose One)*

☐ Category One Site Improvement
☐ Category One Conservation Easement Acquisition
☒ Category Two Pre-Project Activities

☐ **Site Improvement/Conservation Easement Acquisition**	**Select one primary Site Improvement/Conservation Easement Acquisition deliverable**
Project area: _____	☐ Restoration
Total Acres: _____	

<table>
<tr>
<td>SNC Portion (if different): _____
Total Miles (i.e. river or stream bank):_____
SNC Portion (if different): _____

For Conservation Easement Acquisitions Only
☐Appraisal Included
☐Will submit appraisal by_____</td>
<td>☐ Enhancement
☐ Resource Protection
☐ Infrastructure Development / Improvement
☐ Conservation Easement</td>
</tr>
<tr>
<td>☒ Pre-Project Activities</td>
<td>Select <u>one</u> primary Pre-Project deliverable
☐ Permit
☐ CEQA/NEPA Compliance
☒ Appraisal Plan
☐ Condition Assessment
☐ Biological Survey
☐ Environmental Site Assessment</td>
</tr>
</table>

RESOLUTION NO #2011-51

A Resolution approving the application for grant funds for the Pre-engineering Study: City of Alturas biomass-based district heating in support of the forest health Sage Steppe Project, from the Sierra Nevada Conservancy Proposition 84 Healthy Forests Grant Program under the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006.

WHEREAS, the Legislature and Governor of the State of California have provided Funds for the program shown above; and

WHEREAS, the Sierra Nevada Conservancy (SNC) has been delegated the responsibility for the administration of a portion of these funds through a local assistance grants program, establishing necessary procedures; and

WHEREAS, said procedures established by the Sierra Nevada Conservancy require a resolution certifying the approval of application by the City of Alturas governing board before submission of said application to the SNC; and

WHEREAS, the City of Alturas, if selected, will enter into an agreement with the SNC to carry out the project; and

WHEREAS, the City of Alturas has identified the **Pre-engineering Study: City of Alturas biomass-based district heating in support of the forest health Sage Steppe Project** as valuable toward meeting its mission and goals.

BE IT HEREBY RESOLVED by the City Council of the City of Alturas, County of Modoc, State of California, that this City Council:

Approves the submittal of an application for the **Pre-engineering Study: City of Alturas biomass-based district heating in support of the forest health Sage Steppe Project**; and

Certifies that the City of Alturas understands the assurances and certification requirements in the application; and

Certifies the City of Alturas will have sufficient funds to operate and maintain the resource(s) consistent with the long –term benefits described in support of the application; or will secure the resources to do so; and

Certifies that the City of Alturas will comply with all legal requirements as determined during the application process; and

Appoints Director of Public Works, Chester Robertson, or designee, as agent to conduct all negotiations, execute and submit all documents, including but not limited to: applications, agreements, payment requests, and so on, which may be necessary for the completion of the aforementioned project.

PASSED AND ADOPTED by the City Council of the City of Alturas at a special meeting held on the 20th day of December, 2011, by the following vote:

AYES: Councilmembers: John E. Dederick, John Schreiber, Cheryl Nelson, Bobby Ray, Keith Jacques

NOES: None

ABSENT: None

ABSTAIN: None

John Dederick

JOHN E. DEDERICK, Mayor

ATTEST:

Cary L Baker

CARY L. BAKER, City Clerk

STATE OF CALIFORNIA } ss
CITY OF ALTURAS
I, CARY L. BAKER, CITY CLERK DO HEREBY CERTIFY THAT THIS IS A FULL, TRUE AND CORRECT COPY OF THE ORIGINAL DOCUMENT ON FILE IN MY OFFICE. WITNESS MY HAND AND OFFICIAL SEAL THIS 21st DAY OF December 20 11
CARY L. BAKER, CITY CLERK
BY Cary L Baker

5. a. PROJECT DESCRIPTION

A Category 2 Planning Grant leading to Category I priority: “sustainable utilization of biomass and a full range of forest products, including saw logs, resulting from activities associated with improving forest health.”

Project Summary::

A pre-engineering study for a biomass-fueled district heating system in support of the Forest Health Sage Steppe restoration project on the Modoc Forest. Project location: City of Alturas. Project proponent: City of Alturas.

Deliverables:

1. A Preliminary design of the biomass heat generation facility for district wide heating.
2. A Preliminary design of a heating district distribution system with utilization of existing infrastructure.
3. A fuel cost comparison study for customer conversion.
4. Design alternatives to incorporate the use of combined biomass heat and power generation and existing geothermal wells to augment the district heating system.
5. Identification of overall project needs for phased development: financing requirements for construction and operation, project schedule requirements, permits and licenses, safety plans, development of supplier and customer contracts, recommended ownership and management structure, initial operation and management plan requirements.

Project Goals:

Implementation of the project design and overall project needs identified by goal 5 above.

Tie to Forest Health

Specific Goal: Market incentives for forest health treatments

An analysis by the University of Minnesota , *Financial considerations of policy options to enhance biomass utilization for reducing wildfire hazards* (Becker 2009) shows that **the co-location of processing facilities that results in shorter distances traveled is the single most important strategy for reducing costs for forest restoration.**

Current forest treatment costs average $170/ acre. Currently biomass is hauled to Honey Lake for fueling the biomass plant. Through local utilization at the district heating facility, the haul costs will be reduced and return $150/ acre to the agencies (Supply Study, 2011), a net to the agency of over 88% of the cost of treatment. With the future development of a biomass utilization campus (see below), the wood densification facility could pay a higher value of $80 per bone dry ton, returning $350 per acre to the agency, **providing sustainable funding for NEPA planning as well as the land treatment.**

Although the district heating project will probably consume only 1500 bone dry tons(bdt)/yr in Phase I (approx 150 acres/yr), it proves the concept and provides the base for developing more value-added processing which will have a greater impact on forest restoration. For example, a densified wood facility (pellets and bricks) could consume at least 20,000 bdt/yr, providing market incentive for treatment of 2,000 acres/yr. Local value-added can sustain forest health treatments long after grant money and appropriated dollars are reduced.

Local utilization is a key strategy in the Modoc Forest Collaborative Landscape Restoration Project Proposal for implementation of the Sage Steppe Project. (see Letters of Support BLM/USFS).

Forest Health
The Modoc Forest and the Modoc area BLM and local and regional collaborators completed a nine-year planning process (FEIS) for juniper management and habitat improvement on the four million acre Sage Steppe ecosystem of dry coniferous forest lands, juniper woodlands, and sage steppe habitat. Key habitat for the sage grouse, degraded by an incursion of juniper, is currently under threat of high intensity fire. Approximately 200,000 acres of the dry forest within the Modoc National Forest project area are at significant risk of volume loss due to pests and disease over the next 15 years. (FEIS) Forest thinning, juniper removal, and fuels reduction are key forest health strategies identified in the FEIS.

Watershed Improvement
Over stocked forest stands have decreased water yield, impacting flows and fisheries in both the Klamath and Sacramento drainages and into the great Basin. There is a reduction in hydrologic values due to reduction of ground cover (shrubs and grasses) and increases in erosion caused by increased juniper density. Some of the streams in the project area are impaired by excess sediment and runoff that cause physical stream channel changes, which in turn increase water temperature and decrease fish habitat. (FEIS) Juniper reduction is a key strategy to improve water quality and quantity.

Local Utilization Group
The local biomass working group identified biomass thermal as the most accessible use of forest biomass in the near term. This project strategically provides the foundation of a campus for in-county energy production, and value-added processing. The build-out plan includes clustered development on the heating facility site to include combined heat and power generation, densified wood products (pellets and bricks), and other value-added products as appropriate.

Local Development
The City of Alturas seeks to reduce the cost of heating its schools and municipal buildings and offer low cost heat to building owners. As the county seat Alturas serves as a base location for local, state, federal, and tribal government. The project will have a positive impact on the municipal budget for the City and other government agencies, and will assist in the re-development of downtown Alturas. Building owners identified high heating costs (not rents) as the number one barrier to occupancy and retail development in downtown Alturas.

The city schools are plumbed for hot water heating. The sewer is being retrofitted to accommodate the biomass boiler blowdown discharge. A dormant water main system, replaced in this decade, can be used as the primary distribution system.

Environmental Setting –
Land use inside the project boundaries: industrial, commercial, and residential.

5.b. Workplan and Schedule

August 15, 2012 with completion and end date of July 30, 2013

Prepare Solicitation for consultant engineer	Aug 2012
Select consultant engineer	Oct 2012
Engineer draft report/documents	April 2013
Six month report to SNC	Nov 2012
Review engineer report/recommendations	April 2013
Present to City Council with recommendations	June 2013
Initiate Phase II	July 2013
Final report to SNC	Aug 1, 2013
Year One performance measure report	Aug 1, 2014
Year Two performance measure report	Aug 1, 2015
Year Three performance measure report	Aug 1, 2016

5.c. Restrictions as apply and Technical documents.

No restrictions apply. City of Alturas owns the proposed utilization site and access to the existing distribution pipes and operates many of the agencies which will purchase heat from the facility. This is an engineering study and therefore is considered "not a project" under CEQA and NEPA.

Technical documents provided in the attached supporting documents include:
Stage Steppe Collaborative Forest Landscape Restoration Project Proposal (CFLR) (2011)
Biomass Feasibility for Modoc County (2011).
Proposed System for Alturas Dist. Heat BES (2011)
District Heating Building Data (2011)
Draft Schematic-Alturas District Heating Phase I Map (2011)
Pre-work on the RFP (developed with consulting engineer) (2011)

5.d. Organizational Capacity.

In the past five years the City of Alturas Public Works Department has awarded and administered the following grants and projects:

Year	Project Description	Amount	Date Completed	Projected Completion Date
2007	Alturas Wastewater System Phase I-SWRCB and SRF	$3,345,132	04/31/10	
2008	Airfield Pavement Seal, Rehabilitate Joints and Markings, Snow Plow Equipment Aq– FAA	$268,949	Construction Phase – 10/31/11	Equipment Phase – 03/31/12

2011	Warner Street Truck Route Rehabilitation-STIP	$2,182,000		10/31/12
2010/2011	New and Historic Mural Preservation Project - PacifiCorp Foundation 3 Grants	$7,500	Phase 1-10/15/11	Phase 2-09/31/12
2011	LED Retrofit and Cone Module Replacement Project-EECBG	$25,000		03/31/12

Selection criteria for the consulting engineer will include track record and history of completion of similar projects within the United States.

5.e. Cooperation and Community Support

The district heating project has been supported by the county, the city, many community members and organizations as well as potential heat users in the private sector as indicated by the Letters of Support (attached). It was forwarded by a team which included City of Alturas public works director/County Administrative Officer, County Planning Director, County Natural Resource Director, Surprise Valley Supt.of Schools and Watershed Center staff.

The Sage Steppe Restoration Strategy FEIS was developed and supported by the community during a nine-year planning process lead by the Modoc National Forest, the Alturas Field Office (BLM), Modoc County, and the North Cal-Neva Resource Conservation District and the County of Modoc. The full collaborative includes tribes, federal agencies, state agencies, county agencies, special districts, and non-governmental organizations including wildlife, environmental, and community development representatives as well as local private citizens.

5.f. Long-term Management and Sustainability

The district heating project will be financed for construction through a combination of state and federal grants, private equity, and loans. The City of Alturas Public Works Department will provide long-term management of the district heating system. Heat users will provide revenue for the long-term management and maintenance of the system through the usual fee for services process.

5.g. Performance Measures—Key Performance Measure

Percent of pre-project or planning effort resulting in plan implementation.

Data: Progress reported annually for three years following completion of grant.

Additional performance measures one to three years after project completion

1. Kilowatt equivalent of renewable energy developed and produced

Data: Engineering data from schematics

Billing Data from City of Alturas to agencies and private property owners

2. Resources leveraged

Data: Cash and in-kind collected by project manager

Financial agreements for construction
Biomass delivery contract dollar amount

3. Number and type of jobs created

Data: Employee roster from City of Alturas
Tracking by private businesses
Extrapolation based upon biomass delivery contracts to district heating facility

4. Number and value of new, improved, or preserved economic activities

Data: Tracking of increased commercial use of downtown buildings served.
Tracking of biomass delivery contract volume amounts

Appendix B3

SIERRA NEVADA CONSERVANCY
PROPOSITION 84 - DETAILED BUDGET FORM

Project Name: _Pre-engineering Study: City of Alturas in Support of the Forest Health Sage Steppe Project

Applicant: __City of Alturas

SECTION ONE DIRECT COSTS	**Year One**	**Year Two**	**Year Three**	**Year Four**	**Year Five**	**Total**
Project Management Costs	$7,500.00					$7,500.00
Pre-Engineering Study	$51,500.00					$51,500.00
						$0.00
						$0.00
						$0.00
						$0.00
DIRECT COSTS SUBTOTAL:	$59,000.00	$0.00	$0.00	$0.00	$0.00	$59,000.00

SECTION TWO INDIRECT COSTS	**Year One**	**Year Two**	**Year Three**	**Year Four**	**Year Five**	**Total**
Reporting	$3,000.00					$3,000.00
Public Relations/Outreach	$3,300.00					$3,300.00
						$0.00
						$0.00
INDIRECT COSTS SUBTOTAL:	$6,300.00	$0.00	$0.00	$0.00	$0.00	$6,300.00
PROJECT TOTAL:	$65,300.00	$0.00	$0.00	$0.00	$0.00	$65,300.00

SECTION THREE Administrative Costs (Costs may n*ot to exceed 15% of total Project Cost*) :						**Total**
Admin Overhead, City of Alturas	$9,700.00					$9,700.00
						$0.00
						$0.00
						$0.00
						$0.00
ADMINISTRATIVE TOTAL:	$9,700.00	$0.00	$0.00	$0.00	$0.00	$9,700.00
SNC TOTAL GRANT REQUEST:	$75,000.00	$0.00	$0.00	$0.00	$0.00	$75,000.00

SECTION FOUR OTHER PROJECT CONTRIBUTIONS	**Year One**	**Year Two**	**Year Three**	**Year Four**	**Year Five**	**Total**
City of Alturas- in kind	$6,000.00					$6,000.00
Watershed Center-in kind	$5,000.00					$5,000.00
						$0.00
						$0.00
						$0.00
						$0.00
Total Other Contributions:	$5,000.00	$0.00	$0.00	$0.00	$0.00	$11,000.00

NOTE: The categories listed on this form are examples and may or may not be an expense related to the project. Rows may be added or deleted on the form as needed. Applicants should contact the SNC if questions arise.

* Operating Costs should be allocated to the pecentage that is applicable to the grant based on your cost allocation methodology and cannot exceed 15% of your total project costs.

Restrictions, Technical/Environmental Documents and Agreements

No restrictions apply. City of Alturas owns the proposed utilization site and access to the existing distribution pipes and operates many of the agencies which will purchase heat from the facility.

Enclosed are the following technical papers:

Collaborative Forest Landscape Restoration 2011 Proposal

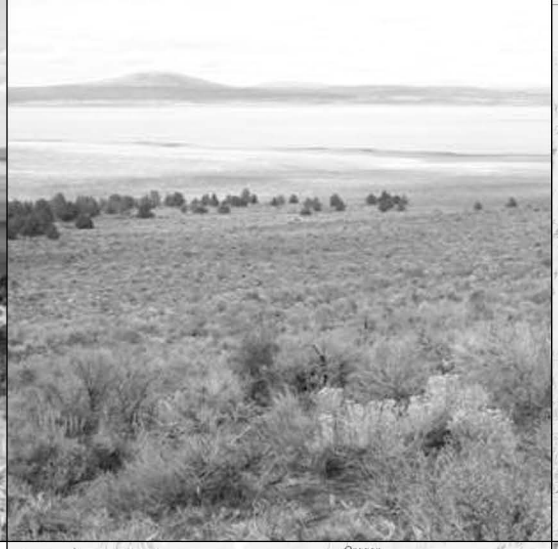
Biomass Feasibility Assessment for Modoc County, CA

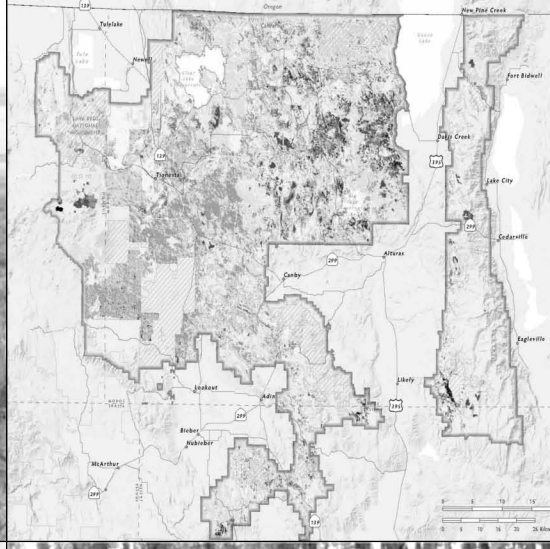
Proposed System for Alturas District Heat from BES

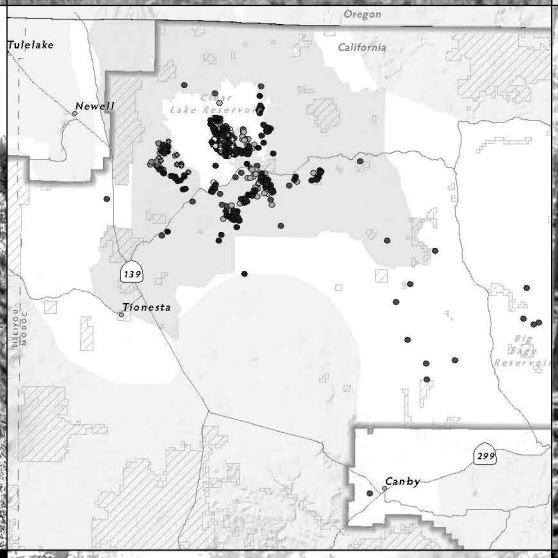
District Heat Building Data

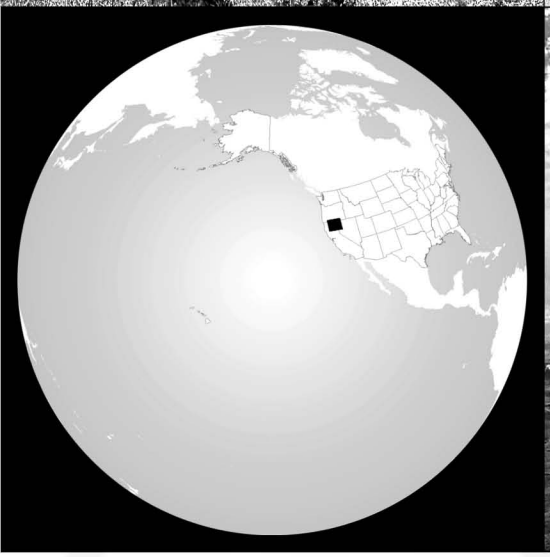
Draft Schematic Alturas District Heating Phase 1 Map

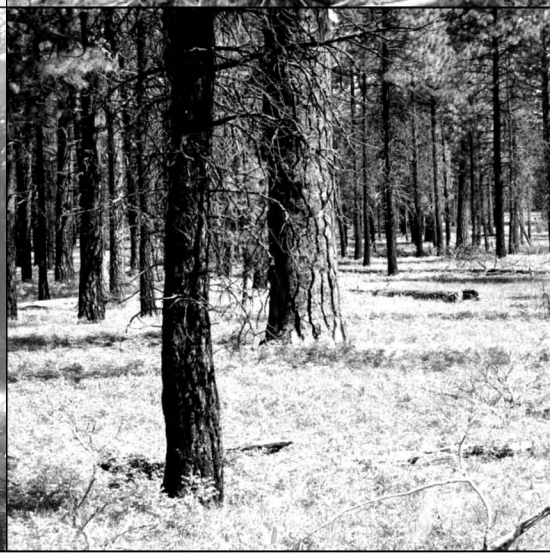
Pre-work for RFP











Collaborative Forest Landscape Restoration

2011 Proposal:
Sage Steppe and Dry-Forest Restoration on the Modoc Plateau, Northeastern California and Western Nevada

Modoc National Forest

Contents

Executive Summary

Dominant vegetation types: sage steppe and dry forests

Total acreage of the landscape: 2,022,511 acres (6.5 million acres with all partners included)

Total acres to receive treatment: 297,205 acres on the Modoc National Forest

Total number of NEPA-ready acres: 25,681

Total number of acres in the NEPA process: 53,321 (see Proposed Treatment section)

The most significant restoration needs and actions on the landscape are to (1) restore sage steppe ecosystems by removing junipers that have encroached since European settlement, and (2) treat dry forests to restore and maintain ecologically appropriate vegetation structure and diversity.

The highest-priority desired outcomes of the project at the end of the 10-year period are to (1) treat sage steppe and dry-forest habitat in support of various collaborative efforts, (2) restore vegetation conditions that facilitate natural processes and allow reintroduction of fire to maintain ecosystems over time, and (3) develop resilient and adaptable vegetation mosaics that are able to withstand environmental changes and disturbances

Biomass and sawtimber are the most significant utilization opportunities expected from implementation of the various restoration activities. Biomass would be used for power generation, fuelwood pellets, or both. Long- term stewardship contracts would result in a substantial and predictable stream of forest by-products available to industry, which would encourage development of closer markets. The forest is working with partners and industry to establish a local biomass power plant or portable fuelwood pellet mill(s).

We are coordinating with the Shasta-Trinity NF and plan to expand this effort to include the Fremont-Winema NF in the future. Thirteen collaborators and numerous partners are working on this project with the Modoc NF: Indian tribes, federal agencies, state agencies, universities, county governments, nongovernmental organizations, and local landowners.

This project would create new jobs in green energy production and on restoration crews. We estimate the net value of restoration between $606 and $1,402 per acre (based on values from the Oregon Forest Resources Institute 2006). Additional community benefits would accrue from proactive enhancement of sage-grouse habitat (a USFWS candidate species) and range allotments. We expect project benefits to significantly exceed costs over the life of the project.

Total dollar amount requested in FY11: $1,614,715

Total dollar amount requested for the life of the project: $16,717,785

Total dollar amount provided as Forest Service match in FY 11: $3,142,090

Total dollar amount provided as Forest Service match for the life of the project: $25,376,890

Total dollar amount provided in partnership match in FY 11: $135,000

Total dollar amount provided in partnership match for the life of the project: $1,800,000

Total in-kind amount provided in partnership match in FY 11: $1,345,571

Total in-kind amount provided in partnership match for the life of the project: $2,545,571

Time frame for the project from start to finish: 2008 to 2025 (includes post-project monitoring for five years)

Ecological, Social, and Economic Context

This proposal describes a 10-year, landscape-level restoration strategy for the sage steppe and dry-forest ecosystems on and adjacent to the Modoc National Forest. Northeastern California and northwestern Nevada contain a variety of habitats for unique plants, wildlife, and fish. Nestled in northeastern California, the Modoc National Forest is a land of ecological contrasts, including vast stands of sagebrush intermixed with coniferous forests, ephemeral wetlands, lava flows, and high-desert plateaus. These features are highlighted in the Modoc Plateau, Medicine Lake Highlands, and Warner Mountain ecoregions. Vernal pools on the Modoc Plateau provide habitat for two federally listed annual grass species, as well as five Region 5 sensitive plant species. Sagebrush areas provide habitat for five endemic sensitive plant species, as well as one of only two known occurrences of a candidate plant species for federal listing. Geologically, the Modoc NF is unique in the world for its obsidian sources, which have added to the rich prehistoric and settlement history. The vastness and remoteness of the Modoc and expansive adjacent ranches create a penetrating solitude that is valued by both locals and visitors, while continuing the cultural heritage of this place.

The Sage Steppe/Dry-Forest Restoration Project is contained within the 6.5 million-acre focus area (figure 1, below). This area includes portions of four national forests, three Bureau of Land Management (BLM) field office lands, two US Fish and Wildlife Service national wildlife refuges, tribal lands, and private lands. The Modoc NF is a mostly contiguous area flanked by BLM, private and tribal lands.

The objective of the Sage Steppe/Dry Forest Project is to treat landscapes regardless of ownership in a holistic fashion. Accordingly, the Modoc National Forest has engaged many partners in all phases of planning, implementation, and monitoring; see Section 4, Collaboration and Multi-party monitoring, as well as attachment C, for a listing of them.

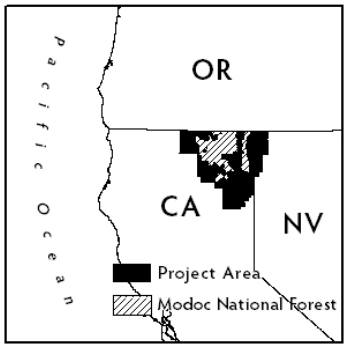


Figure 1. Location of Project

The Modoc Plateau, a dominant feature on the Modoc National Forest, is a large, high-desert plateau that contains dry-forest pine stands, juniper woodlands, as well as sage steppe habitats; this landscape is home to sensitive plants found only here and several focus fish and wildlife species. The Modoc National Forest is a blend of coniferous forest and sagebrush stands that reflect the subtle changes of aspect, slope, and site. Historic landscape vegetation patterns in the sage steppe habitats consisted of a mosaic of big and low sagebrush, grasslands, and western juniper. Historically, low-intensity, fire-controlled seedling numbers and growth promoted fire-tolerant species and maintained a variety of forest conditions, such that the historic forest included a higher proportion of low-density stands of trees than exists today. Fires naturally reduced accumulating fuels from leaves, branches and needles, and maintained wildlife habitat for species that require an open stand structure. Forest stands that had fewer trees likely had higher general vigor and were less susceptible to attack from insects during dry summers, especially during sustained drought.

Within the Modoc National Forest project landscape, there exists close to 785,000 acres of sage steppe ecosystem, of which approximately 240,000 acres are threatened by varying stages of juniper encroachment (sources: Sage Steppe Ecosystem FEIS, R5 Remote Sensing Lab's existing vegetation data layer). Approximately 200,000 of 888,216 acres of the dry forest within the Modoc National Forest project landscape are at significant risk of volume loss due to pests and disease over the next 15 years (sources: Forest Health Monitoring Division of the R5 Remote Sensing Lab's pest and

disease risk data, R5 Remote Sensing Lab's existing vegetation data layer, Sage Steppe Ecosystem FEIS).

During the past 150 years human influences—livestock grazing, timber management, introduction of nonnative invasive species, and fire suppression—have altered natural conditions. The Modoc Plateau is a landscape whose historical plant communities were created and maintained by fire; the absence of wildfire over the last 100 years has subsequently degraded natural plant community composition and function. This has resulted in widespread juniper encroachment into sage steppe communities and significantly increased fuel loads in the dry forest. Dr. Miller of Oregon State University and others found a 75 percent reduction in the shrub understory once juniper canopy exceeded 30 percent.

In both cases, understory vegetation has been adversely affected and natural processes have been altered. In the past, low-intensity fires promoted growth of fire-resistant species and more open stands of trees and shrubs. These stands were more resilient to disturbances, and provided habitat for wildlife, fish, and plant species that evolved in the area.

Invasion by nonnative plants, including annual invasive grasses such as cheatgrass and medusahead, as well as other noxious weeds including dyer's woad, Scotch thistle, Canada thistle, Mediterranean sage, Dalmatian toadflax, spotted knapweed, hoary cress, crupina, and Klamathweed, has severely degraded portions of the Modoc Plateau. Many of these species increase dramatically following fire, and annual invasive grasses can even alter fire regimes due to their high flammability and early-season production and drying. Presence of these invasive species also reduces wildlife habitat quality by replacing valuable forage plants.

Scientific models predicting the effects of climate change indicate that dry forests may experience warmer, drier summers and warmer winters. It is also predicted that precipitation patterns will change, with the snow line becoming higher and less precipitation falling as snow. Summers are likely to be drier than they are currently. Historic temperature and precipitation data reflect these trends locally.

There is also a reduction in hydrologic values due to reduction of ground cover and increases in erosion caused by increased juniper density. Some of the streams in the project area are impaired by excess sediment and runoff that cause physical stream channel changes, which in turn increase water temperatures and decrease fish habitat quality.

Wildlife species have experienced subsequent changes in distribution and abundance with the changes in vegetation patterns. Sage grouse and antelope, historically an integral part of sage steppe habitats, have decreased. Thousands of greater sage-grouse, a Forest Service sensitive and USFWS candidate species, occupied the Devil's Garden Plateau until a major decline occurred, which appears to have begun in the 1950's. According to the Devil's Garden-Clear Lake Sage-grouse Working Group, increases in juniper density are the primary factor in the decrease in the amount and quality of greater sage-grouse habitat. Similarly, pronghorn antelope habitat also appears to be affected in part by juniper encroachment, as well as the expansion of noxious weeds and exotic annual grasses. There has been a similar decrease in the amount of potential mule deer and elk foraging opportunities with the increase in overstory coniferous canopy cover. In addition, there is a need for recruitment of large-diameter pines to provide habitats for species such as bald eagle, another Forest Service sensitive species.

Consequently, we anticipate that future wildland fires would begin to exhibit augmented fire intensity and severity characteristics that increase risk and exposure to firefighters and the public, jeopardize resource values, and increase fire management costs.

Modoc County is consistently in the lowest 20 percent of California counties in median household income, per capita income, and other recognized indicators of economic status. Unemployment and percentage in poverty are constantly much higher than the state average. The population is stagnant and total employment has declined for ten years. The population is growing older as younger citizens leave the county to find employment. The total employment number is below that of the year 2000.

The county is poorly located to compete for the relocation of existing and expanding businesses. Biomass related industry is the county's best hope for creating jobs and increasing tax revenues. It would allow for the use of a renewable resource without having to address the drawbacks of producing a product that must be shipped a long distance to market.

Biomass would have a two-fold direct benefit to the local economy. Jobs would be created both for the operation of the facility(ies), as well as employment generated with the production and transporting of the wood chips. There would be additional property taxes generated with the installation of the power plant.

Perhaps of equal importance to the local economy would be the indirect impact from the major improvement to land health from the treatments that produce the biomass. Grazing on the Modoc National Forest is a key component in the private sector of the county economy. Densification of western juniper in the sage steppe ecosystem is having a significant impact on forage production available for livestock. Treatments done under the CFLR project would have significant benefits for sage-grouse and other sage steppe-dependent species. Enhancement of this habitat would not only provide for these species, but also help maintain grazing at viable levels.

Six Indian tribes have relevant interests in the proposed project: the Ft. Bidwell Indian Community, Cedarville Rancheria, Alturas Rancheria, Susanville Rancheria, Klamath Tribes, and Pit River Tribe. The following are projects that take place in participating agreements with these various tribes: noxious weed control, native tobacco restoration, fuels reduction, and watershed restoration. These projects would be addressed within the scope of the sage steppe restoration efforts because the tribes want improvements on Forest Service land adjacent to tribal lands. In addition, the proposed project area would possibly create a job training or employment opportunity for tribal members.

While much reduced from levels of the past, mule deer and pronghorn hunting is still an important component of the local economy. Most biologists agree that habitat reduction caused by the increased density of western juniper is a major cause for the substantial reduction in area herds. The treatments that produce a biomass waste stream would make substantial improvements to big-game habitat. CFLR also proposes treatments, both in the sage steppe and timberlands, that would enhance the burgeoning Rocky Mountain Elk population. This could also become a mainstay of local commerce.

The CFLR planning area is ringed with several biomass power plants. However sales of wood chips for these plants were already problematic, even before the recent spike in diesel fuel prices. CFLR is well positioned to provide an assurance of supply for a locally sited plant that could buy wood chips because there would be considerably lower freight costs. The local Alternative Energy Working Group is in the preliminary stages of developing a joint powers authority, which could hold stewardship contracts that would implement CFLR projects. These contracts would then provide additional supply assurance for the investment sought to develop a facility. Private investment would be needed to go with public investment for a jointly owned public-private operation. A fully public-owned plant could not use the tax credit, which could equal 40 percent of the total cost.

The economic impact of our proposed project can be estimated by viewing the outcomes of similar projects and in-depth economic analyses. An analysis by Northern Arizona University concluded it was cost effective to spend up to $505 per acre to restore forests to prevent catastrophic fire and associated fire suppression costs in Arizona's ponderosa pine forests (Analysis of Costs and Benefits of Restoration-Based Hazardous Fuel Reduction: Treatments vs. No Treatments, 2003). An analysis prepared for the Oregon Forest Resources Institute estimated net benefits of fuel reduction treatments in eastern and southern Oregon ranged from $606 to $1,402 plus per acre. The results also suggest that environmental benefits of forest biomass use for energy are well in excess of the market value of the electricity produced (Biomass Energy and Biofuels from Oregon's Forests, 2006).

Our proposed project is similar in design to the White Mountain Stewardship Project on the Apache and Sitgreaves National Forests of Arizona. That project created 226 direct forest industry jobs and 93 indirect jobs for a total of 319 total jobs (www.futureforest.info/). A report published by The Nature Conservancy predicted the project would generate $6,782,290 in tax revenue over its ten-year life span (The First Five Years of the White Mountain Stewardship Project, 2010).

An analysis for the Oregon Department of Energy estimated that operation of a five-megawatt plant would create 16 jobs at the plant and 18 jobs in procurement, for a total of 39 new jobs. A larger, 25 megawatt plant was estimated to support 71 new jobs (Biomass Resource Assessment and Utilization Options for Three Counties in Eastern Oregon, 2003). The numbers of indirect jobs expected were not reported. However, the Oregon Forest Resources Institute concludes that indirect job creation is usually in the range of two to three indirect jobs created for each direct job. See Benefits to Local Economies for specifics on how these figures apply to Modoc County.

Summary of Landscape Strategy

The Modoc National Forest CFLR proposal fits directly with the US Forest Service Mission, "…to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations." The Modoc NF is working to achieve quality land management under the sustainable multiple-use management concept to meet the diverse needs of people in part by (1) promoting the productivity and diversity of National Forest System lands in addition to those adjacent to ours, regardless of jurisdiction (2) collaborating with people and responding to their diverse needs in making decisions, (3) developing and providing scientific and technical knowledge to improve our capability to manage the Modoc NF. The foregoing information was drawn from the following Forest Service Web site: http://www.fs.fed.us/aboutus/mission.shtml

There are two guiding documents for sage steppe restoration: (1) the Sage Steppe Ecosystem Restoration Strategy FEIS, which amended the Modoc NF Forest Plan (http://www.fs.fed.us/r5/modoc/projects/sagebrush-restoration-web/FEIS/FEIS%20Index.shtml), and (2) the Conservation and Recovery Strategy for Sage-grouse (*Centrocercus urophasianus*) and Sagebrush Ecosystems within the Devil's Garden / Clear Lake Population Management Unit (http://greatbasin.wr.usgs.gov/LWG/LWGdetail.asp?State=CA&LWG=35).

For dry-forest systems, the Upper Pit River Watershed Management Strategy provides management options (http://www.pitriveralliance.net/).

With respect to sage steppe systems, the purpose of the Sage Steppe Ecosystem Restoration Strategy (Sage Steppe Strategy) is to adopt an approach for juniper management on National Forest and Bureau of Land Management lands to restore the sage steppe ecosystem and associated vegetative communities to desired habitat conditions reflecting ecological processes that existed prior to

European settlement (p. ii FEIS). More specifically, the purpose of the Sage Steppe Strategy is to restore sage steppe ecosystem processes and vegetation conditions that resemble historic mosaics so that historic fire return intervals in the sage steppe can be sustained. Additional objectives include improving watershed function and condition, restoring biodiversity and productivity (for both plants and animals), managing fuels to conform to the National Fire Plan requirements, and implementing, (where appropriate) national renewable-energy direction.

The sage steppe ecosystem provides a significant forage base for livestock permittees in Modoc County. Livestock management is one of the primary businesses supporting Modoc County making restoration of sage steppe habitats extremely important. This, coupled with the potential listing of the sage-grouse, makes implementation of sage steppe restoration projects critical from a social, economic, and ecological standpoint. The acres chosen for treatment are a priority because treatments have a great chance of success due to the presence of native understories (which increase the likelihood of treatment success), as well as the strong partnerships in place to help in planning, implementation, and monitoring of restoration activities. One side benefit form some of the acres proposed for treatment would also be a steady stream of biomass.

Dry-forest management in part comes under the strategies included in the Upper Pit River Watershed Management Strategy. The mission of the Pit River Alliance, the umbrella organization of collaborators working toward large-scale management goals in the Pit River basin, is to foster partnerships that achieve integrated long-term cultural, economic, and environmental health of the watershed through community participation. Among their goals is improvement of water quality and quantity in the Pit River and tributary streams, as well as sustaining and improving upland vegetation and wildlife communities. One of their specific objectives is to improve and maintain forest ecosystems through various activities, including thinning, thereby maintaining and increasing forest products industry capacity in order to implement treatments (Upper Pit River Management Strategy p. 25). The areas proposed for treatment in the dry forest would provide community stability through the flow of goods such as biomass and sawlogs

Other restoration activities such as targeted treatment of noxious weeds and watershed improvements would also aid in watershed enhancement while providing jobs in the local community. See the Benefits to Local Economies section and attachment E for specifics.

Proposed Treatment

The proposed treatment is a 10-year, landscape-level restoration strategy for sage steppe and dry-forest ecosystems. The treatment landscape is defined by the vegetation regardless of land ownership. However, modeling conventions make using this approach difficult. Therefore, the RCAT landscape will encompass the majority of treatment polygons; however, some treatments may occur on the Warner Mountains and western portions of the Doublehead and Big Valley Ranger Districts that are outside of the RCAT but within the boundaries of our collaborative partnerships. The smaller subset polygon was drawn to encompass the majority of the treatment areas without adding significant non-treated NFS acres, which would skew the results of the outputs of the models. There are 155,000 acres on the Modoc NF that are planned for treatment using CFLR, appropriated, and partners' funds, as these become available. The Shasta-Trinity NF would be included in future CFLR requests, pending acceptance of the Modoc NF proposal.

Multiple objectives would be met by treatments across the landscape. Thinning would restore resilience to dry-forest and sage steppe stands by returning systems to the conditions where fire is an important mechanism in their maintenance. Restoration treatments would reduce forest susceptibility to insects, pathogens, and large-scale fires by reducing tree density and promoting fire-

and drought-adapted tree species. Likewise, restoration treatments in the sage steppe would reestablish sagebrush and associated grass and forb species by reducing juniper density. All of these restoration treatments would, in turn, provide for habitat for special-status wildlife species and enhance native plant understories.

Ecosystem restoration efforts would include the use of the following: prescribed fire, mechanical thinning of coniferous trees, treatment of invasive plants, plantings of native species, fencing, water developments, and watershed restoration. See attachment A for a list of activities and funding needs tied to each one.

Sage steppe treatment priorities have been strategized in part through efforts of the Sage Grouse Working Group. The highest-priority sites are located in areas that currently or recently contained sage-grouse. The secondary priorities are those lands that provide corridors for movement of grouse within and between population management areas (i.e., north towards BLM Forest Service lands in Oregon). The working group contains both federal and non-government partners, who are conducting treatments on their own lands. In the case of the USFWS, the Clear Lake Refuge is totally encompassed by the Modoc National Forest. USFWS personnel have completed sage steppe and sage-grouse habitat improvements throughout the refuge. They are also helping coordinate with the NRCS, the efforts on private lands contained within and adjacent to the boundaries of the Modoc NF.

Dry-forest strategic planning is part of the Upper Pit River Watershed Management Strategy. Restoring forest ecosystems to fire-adapted, resilient systems is one of the foci of this strategy.

Our goal is to develop resilient and adaptable forest stands that are better able to withstand inevitable environmental changes and disturbance. Dry-forest restoration treatments would change forest stand susceptibility to insects and pathogens by reducing tree density and promoting fire-and drought-adapted tree species through selective thinning and planting with pine, following disturbances. Dry-forest restoration treatments would increase landscape heterogeneity with strategically located treatments, and would change stand susceptibility to insects and pathogens by reducing tree density and changing tree species composition to promote fire- and drought-adapted pines. Historic conditions and conditions anticipated as a result of climate changes, would drive site-specific treatment prescriptions that reduce tree density, shift tree species composition, and manage fuels. The desired forest structure at the landscape scale would be patchier and composed of even- and uneven-aged forest at variable, but overall lower densities, that are based on site capacity. Managing forest density improves the health and reduces tree mortality, resulting in reduced fuel loadings and accumulation.

In general, treatments would work to restore historic patterns of stand structure, fire intensity, and fire frequency. Treatments in dry-forest stands could provide habitat for two Region 5 Sensitive species (bald eagle and great grey owl), as well as mule deer and elk.

Another example would be the removal of encroaching junipers, encouraging the growth of understory vegetation. These grasses, forbs, and shrubs in turn provide foraging habitats for native wildlife and livestock. Wildlife species provide recreational opportunities (e.g., hunting, wildlife viewing) while livestock operations are a backbone industry for Modoc County and the surrounding communities.

Restoration efforts would benefit multiple resources. After treatment, stands would function closer to the pre-1870's landscape functioning described in the Sage Steppe Ecosystem Restoration Strategy FEIS. Sage steppe stands would contain a mosaic of grasses, different stages of sagebrush with scattered juniper trees, and juniper woodlands. Frequent fires of varying intensities would help

maintain resilient stands. Native understory plants would increase, providing wildlife habitat and maintaining soil productivity and watershed health. Sage-dependent species such as Swainson's hawk (Region 5 sensitive species), brewer's sparrow, loggerhead shrike, and mule deer would benefit from sage steppe improvements; pygmy rabbit (a California species of special concern) would benefit as well.

The increases in long-term ground cover and the use of best management practices (BMPs) would minimize soil erosion and maintain water quality. The implementation of watershed improvement projects proposed under this grant would improve watershed function. The amount of short-term disturbances and erosion would be minimal due to implementation of BMPs. The anticipated positive trends in long-term ground cover and stream function are consistent with the direction of the Modoc NF Forest Plan, with respect to watershed and soil resources.

Additional activities to enhance understory vegetation include the following: (1) monitoring understory plant and invasive species responses to juniper removal treatments; (2) noxious weed treatment, within the protocols of the 2008 Modoc National Forest Noxious Weed Treatment Project FEIS and ROD, including both physical and chemical treatments; and (3) restoration plantings to bolster the native plant community and increase its resistance to non-natives, using native seed sources from local genetic stock. Funding from the CFLR for noxious weed treatment would expand current levels of treatment implemented though cooperative agreements with the Pit River Tribe, Central Modoc Resource Conservation District, and the Alturas Field Office of the BLM.

In anticipation of the need for native grass seed of local genetic stock for sage steppe restoration, a native grass seed grow-out project was initiated in 2009. Funding was acquired to establish 1.25 acres of native grass seed production plantings at J. Herbert Stone Nursery, for three years of seed production. Native grass seed was collected from the Modoc National Forest in 2009, sufficient to plant 0.25 acre during the fall, 2009 sowing at the nursery. Additional native grass seed was collected in 2010, sufficient to sow an additional acre at J. Herbert Stone Nursery in fall 2010. An additional $2,600 is currently obligated to the Bend Seed Extractory for seed cleaning and testing of future Modoc National Forest native seed collections and for future seed increase grow-outs. A resource advisory committee grant proposal was submitted for 2011 funding of further native seed collection, through a partnership with a local non-profit group, The River Center (Alturas), using a crew of local high school students.

Additional restoration of native tobacco (*Nicotiana attenuata*), a culturally important but declining species used by Native Americans, is being performed with Regional Native Plant Materials funding in cooperation with Cultural Advocates for Native Youth, an organization based in the Cedarville Indian Rancheria. This project would use burn piles from sage steppe restoration projects, which provide the preferred habitat for native tobacco.

CFLR funding would be used to increase production of seed from local native plant populations, as well as develop container stock for out-plantings. The Shasta-McCloud Management Unit Greenhouse and Nursery, on the Shasta-Trinity National Forest, would grow container stock of forb and shrub species for restoration plantings, including species of traditional cultural importance to local Indian tribes. By bolstering native plant communities in areas at risk of noxious weed infestations, we have an opportunity to prevent large-scale infestations, which can be very expensive and very difficult to combat, particularly annual invasive grasses.

Use of local genetic stocks retains the genetically-based ecological adaptations to local climate and site characteristics. Use of seed or container stock plantings would be focused on those sites where

the risk of noxious weeds exceeds the risk of ecological adaptation losses through dilution of native plant genetics already present. Wherever possible, treatments would strive for prevention of weed infestation and spread through support of the on-site native plant community. A project-specific noxious weed and rare plant survey would be performed, and a weed risk assessment would be developed for each project site.

Restored vegetation is expected to contain a diverse mix of native grasses, forbs, and shrubs, as well as retained old-growth juniper trees that reflect locally adapted genotypes of native vegetation. Long-term monitoring, in accordance with established protocols, would identify deviations from this anticipated goal, and would trigger an adaptive management response in project implementation protocols to achieve the desired outcome.

Old-growth juniper trees are maintained thorough the sage steppe project areas through monitoring occurring both during and after the project implementation phases. The results of this monitoring would be housed in an interagency database being developed by the BLM and USGS. Old growth would be maintained in the dry-forest stands by both the implementation of standards and guidelines in the Sierra Nevada Forest Plan Amendment, and marking guidelines.

The best available science was the underpinning for the selection of treatments in the Sage Steppe Strategy FEIS. There is also a built-in adaptive management loop within the Sage Steppe FEIS ROD with the formation of the technical advisory committee that enables managers to review treatments to discern whether they need to be altered, based on the most current science.

Within the sage steppe treatments, the Sage Steppe Ecosystem Restoration Strategy FEIS provides the programmatic NEPA framework and large-scale cumulative effects analyses for activities in this ecosystem. The ROD for the Strategy amended the Modoc NF Forest Plan, adding design standards to projects being implemented within the scope of the strategy. Several site specific projects pertaining to juniper density reduction, water source improvements, and habitat protection are currently in the NEPA process. These smaller projects have used the Council on Environmental Quality regulations for categorical exclusions (CEs) to implement the NEPA. Other similar projects, also using the categorical exclusion, will be completed this winter. Future projects under the Sage Steppe Ecosystem Restoration Strategy would cover additional juniper work, fencing, habitat improvements, and native vegetation improvements.

Within the dry-forest type, the Sierra Nevada Forest Plan Amendment, together with the Modoc NF Forest Plan, are the guides. Projects within this ecosystem would involve more thinning from below, reduction of fuels through various treatments (prescribed burning, thinning, mowing) and habitat enhancement activities. At least six projects have decisions and are ready for implementation. Another nine projects are identified as future activities to support this landscape proposal. These projects would provide timber and biomass products.

To provide for treatments over the ten-year time frame, site-specific projects pertaining to this landscape restoration would be analyzed, applying the appropriate NEPA process to assure decisions are "fresh" and required surveys are conducted to provide the foundation of the effects analyses. Depending on survey results, potential impacts of projects, resources present, and types of land allocations, most of the smaller projects may be completed using categorical exclusions to implement the NEPA process. Larger-scale projects involving more complicated analyses, such as may occur with the presence of certain resources or land allocations, would use environmental assessments or environmental impact statements to document the NEPA process.

Approximately 9 percent of projects are classed as NEPA-ready acres (25,681 acres), meaning they have completed the NEPA process. However, another 18 percent (53,321 acres) are at some point

in the NEPA process and are projected to be completed during the second half of 2011 or first half of 2012. The remaining projects (approximately 73 percent of the proposal) are slated for funding—depending on completion over the following 7 to 8 years with approximately 6 percent already identified in 2013, 2 percent in 2014, another 2 percent in 2015, and 63 percent over the remaining years. Without an actual funding base, out-year planning is difficult. Analysis areas (NEPA acres) may or may not reflect actual treatment acres; they are usually larger. However, across the landscape, what is not treated and why is just as important as what is treated. All acres considered need to be analyzed for effects. The map in attachment G shows the location of proposed treatments.

The removal of fire from the sage steppe landscape, combined with heavy historic grazing (expressed in the Sage Steppe Ecosystem Restoration Strategy FEIS, p. 5), has altered the vegetation in such a manner that the potential for uncharacteristic fire behavior has become prevalent in this ecosystem. In areas with the most severe departure from historical conditions (condition class three), juniper trees dominate the sites, resulting in total removal of brush, grasses, and forbs that historically carried frequent fires. In areas of condition class two, juniper trees are less dominant but the density of sagebrush is having similar effects on the grasses and forbs.

Cumulatively, the density of juniper and sagebrush has reduced the fine fuels (grasses and forbs) that would have burned frequently (3 to100-year fire return interval) and maintained the natural mosaic pattern of grasses, brush, and sparse juniper, characteristic of the desired conditions within the sage steppe ecosystem. Without management intervention on these lands, juniper and sagebrush would continue to homogenize the landscape, causing stand-replacing fires with unvarying severity that would continue to degrade this ecosystem.

Effective fire suppression and land-use practices over the last century have altered forest structure and increased fuel loads within the dry-forest ecosystems on the Modoc National Forest. Stands of ponderosa pine and juniper have continued to move away from historically frequent fire-return intervals (2 to 25 years), the vegetative conditions associated with low-intensity fire behavior. High accumulations of surface fuels (needles, litter, branch wood), ladder fuels (understory saplings, smaller trees, and brush), and canopy (continuous foliage and branch wood as a result of tree density) have increased the potential for fires that are uncharacteristic of historical fire intensities and severity. The accumulation of fuels and dense canopy has increased the potential for stand-replacing, catastrophic fire behavior.

The goal is to reduce potential wildfire severity, size, and cost by implementing hand and mechanical thinning in conjunction with prescribed burning to support ecological restoration and return the natural processes that would reestablish the vegetative conditions associated with historical fire regimes(fire regime condition classes two and one). Reduction of surface fuels, the interruption of the horizontal and vertical continuity of ladder and canopy fuels, and the mosaic of vegetative conditions created as a result of restorative activities stated above, would reduce expected fire intensity levels and fire severity within treatment areas. Areas treated would also give fire managers the ability to allow fires to burn to meet resource objectives naturally, without the threat of potential damage to the ecosystem or private property.

We propose to treat approximately 3,000 acres annually with prescribed fire. An approximate breakdown of 1,000 acres of pile burning and 2,000 acres of broadcast burning is planned in the treatment areas over the decade of CLFR funding. We would Implement the burns in strategic bands across the focus area, keeping in mind that the uncharacteristic fires experienced on the Modoc Plateau are wind-driven events. The bands of fuels treatments across the landscape would allow fire managers multiple options on how to engage and handle wildfires started in or around the

treatment areas identified. The proposed treatments would be monitored by the fuels specialist for treatment effectiveness.

The Modoc NF cannot treat every acre identified in this landscape. However, we expect to realize a landscape-level reduction in fire spread, severity, and size as a result of the strategic placement and interaction of past, current, and future treatments identified within this proposal area. (The proposed treatments are located near past treatments and planned to be connected over time, thereby capitalizing on past treatments. The Modoc N.F. could potentially experience $6,000,000-plus (based moderate beneficial use according to the R-CAT analysis) in fire suppression costs savings over the life of the treatment. Essentially, as the land is brought under the proposed management, suppression costs would decrease and we would allow naturally occurring fire to meet resource objectives. The cost savings may be realized beyond the ten-year analysis in that prescribed burning, fire allowed to burn to meet resource objectives, and fuel treatments would continue in the focus area beyond the life of the CLFR funding.

This proposal would reduce long-term costs by analyzing and identifying areas within the landscape where expected fire behavior and fire effects are consistent with desired conditions. We would also manage wildland fire to meet resource objectives.

The Modoc National Forest is located in two separate counties, Lassen and Modoc. Each county has separate fire safe councils that have met in the past to coordinate fire concerns. The Modoc NF has worked with both fire safe councils to assist in developing community wildfire protection plans (CWPPs) to protect areas near the wildland-urban interface (WUI). Treatments proposed here are similar to the treatments planned and implemented in the CWPPs, and would assist in protecting critical infrastructure (i.e., roads) and small communities.

Collaboration and Multiparty Monitoring

Northeastern California has long managed sage steppe and dry-forest resources in a collaborative manner. During the fall of 2010, the Modoc National Forest, the Alturas Field Office (BLM), Modoc County, and the North Cal-Neva Resource Conservation District received the Partners in Conservation Award signed by the Secretary of the Department of the Interior, Ken Salazar, in recognition for the planning and implementation of sage steppe restoration activities; sage steppe restoration is one of the key components of the CFLR proposal.

The following organizations have worked together on resource management issues; their membership includes livestock permittees, environmental groups, state and federal agencies, sportsmen's organizations, and elected officials: The Northeast California Resource Advisory Council, the Modoc-Washoe Experimental Stewardship Program, the Modoc County Resource Advisory Committee, the Modoc County Land Use Committee, the Timber Program Working Group, the Sage Steppe Technical Advisory Committee, and the Alternative Energy Working Group. The Modoc-Washoe Experimental Stewardship Program, founded in 1984, has the longest history of advising and recommending management options to the Modoc National Forest and the BLM Surprise Field Office (Cedarville). These organizations are readily available to aid in the various facets of management needed to enable the Modoc NF to succeed with its CFLR restoration activities.

A number of these groups have participated in the development of the Sage Steppe Ecosystem Restoration Strategy and in dry-forest management. The Sage Steppe Ecosystem Restoration Strategy FEIS is the first landscape planning document of its kind in the nation, in that it crosses ownership boundaries (FS and BLM). It is also the first planning effort with a county government as a full planning partner. In addition, there are new collaborative groups that have been helping with

planning, implementation, and monitoring. They are also now participating in the development of the CFLR proposal. See attachments C & D for a list of collaborators and their letter of commitment for the Modoc CFLR. Many of our partners have provided letters of support for the CFLR proposal. These letters are available for review at http://www.fs.fed.us/r5/modoc/.

The strategy of the CFLR proposal is based on the Sage Steppe Ecosystem Restoration Strategy FEIS and Record of Decision. These documents are in themselves the result of collaboration between the FS, BLM, and many other partners. The FEIS was funded in part by the Modoc County Resource Advisory Committee.

The Modoc National Forest has a long history of working with partners to accomplish management objectives. For the purpose of this proposal, partners are categorized as those organizations that have been instrumental in implementation, but have not been meeting in a scheduled fashion to strategize implementation and monitoring activities. In many cases, partners have provided money to carry out treatments such as aspen regeneration; sage steppe restoration; threatened, endangered, and sensitive fish, wildlife, and plant species habitat enhancement; and thinning and prescribed burning. Many of the partnerships dovetail with the CFLR-proposed treatment activities.

Partners for noxious weed treatment are the Central Modoc Resource Conservation District, Bureau of Land Management, and Pit River Tribe. The NRCS and Goose Lake Resource Conservation District are assisting with mapping noxious weeds on the forest, and are treating noxious weeds on lands adjacent to the forest. The River Center (Alturas) is a partner for interpretative panels and native grass seed collection in support of native plant community restoration. Cultural Advocates for Native Youth, affiliated with the Cedarville Indian Rancheria, is a partner for native tobacco restoration. Following is a list of groups with whom we have collaborated on this proposal:

- Indian tribes: Pit River Tribe and Cedarville Indian Rancheria
- Federal agencies: Surprise, Alturas, and Eagle Lake Field Offices of the Bureau of Land Management, USDI Fish and Wildlife Service – Modoc and Klamath Basin National Wildlife Refuges and Klamath Falls Office, and the USDA Natural Resource Conservation Service
- State agencies: California Department of Fish and Game, the University of California Cooperative Extension, Oregon State University (in an advisory capacity)
- County agencies: Modoc County Land Use Committee, Modoc County Resource Advisory Committee, Lassen Fire Safe Council
- Special districts: North Cal-Neva Resource Conservation and Development, and Goose Lake, Central Modoc, Lava Beds-Butte Valley, and Pit Resource Conservation Districts
- Nongovernmental organizations: Rocky Mountain Elk Foundation, National Wild Turkey Federation, California Deer Association, Pacific Forest Trust, The River Center (Alturas), The Watershed Research and Training Center, Mule Deer Foundation, Ducks Unlimited, CO Top, and local landowners

Some of the partners listed above are also active in collaborative efforts to manage sage steppe and dry-forest ecosystems. We are coordinating with the Shasta-Trinity NF and plan to expand this effort to include the Fremont-Winema NF in the future. A number of groups—not just one—are collaborating to help the Modoc NF plan, implement, and monitor the CFLR projects. This is because the project area consists of a series of small communities in a county of about 9,000 people. Therefore, we do not have a lot of resources and must cooperate to attain common goals.

Various organizations are working to establish multiparty monitoring across various jurisdictions. Other efforts have used collaborative forums to help provide alternative management strategies.

Some of these organizations are the Goose Lake Fishes Working Group, the Modoc-Washoe Experimental Stewardship Program (above), the Devil's Garden/Clear Lake Sage-Grouse Working Group, and Modoc Economic Vitality.

These collaborative groups have helped develop overall management strategies, which are the foundation of the proposed CFLR proposal, and several have also begun implementation. Treatments have occurred on federal lands (USFS, BLM, and USFWS), as well as private lands. These groups have been working together for five to ten years on various stages of sage steppe and dry-forest restoration. However, these efforts are just the beginning; much remains to be accomplished.

Although multiple partners have worked with the Modoc NF in support of the various phases of the dry-forest and sage steppe management, the collaborative strategies from the Devil's Garden/Clear Lake Sage Grouse Working Group and the Pit River Watershed Alliance tie directly into support of the CFLR proposal. The Pit River Watershed Alliance was formed in December 1999. Since that time, a variety of stakeholders (including Modoc NF) have participated in the alliance and identified priority projects and resource issues. The alliance holds quarterly meetings; the group's activities enable private landowners and stakeholders in addition to local, state and federal agencies, to share ideas, skills, and leverage funding opportunities to complete projects. The alliance provides a forum where these efforts can be coordinated, so that important work is addressed and duplication of effort is avoided. The alliance uses a consensus decision-making process.

The Devil's Garden/Clear Lake Sage-Grouse Working Group is made up of the various stakeholders involved with greater sage-grouse population and habitat management, including local livestock permittees, state and federal agency biologists, University of California Cooperative Extension staff, and NRCS personnel. The major stakeholders have met over the span of six years to develop management strategies that could provide for everyone's needs, from improved greater sage-grouse habitat to associated increases in livestock forage. Also, the group coordinates obtaining funds from various grants for restoration activities. By increased communication fostered by their meetings, they have been able to prioritize areas for restoration and remove duplication of efforts, thereby increasing efficiency of restoration activities. The Clear Lake Sage-Grouse Working Group was formed in 2004 to address the declining Clear Lake sage-grouse population. The working group consists of landowners and public land permittees, individuals from the Bureau of Land Management (BLM), California Department of Fish and Game (CDFG), Lava Beds-Butte Valley Resource Conservation District (RCD), Ore-Cal Resource Conservation and Development (RC&D), U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), National Park Service, Lava Beds National Monument (NPS), Natural Resource Conservation Service (NRCS), and University of California Cooperative Extension (UCCE). The working group usually meets quarterly, sometimes monthly. They use majority rule in their decision-making process.

The working group completed the *Conservation Strategy for Sage-Grouse (Centrocercus urophasianus) and Sagebrush Ecosystems within the Devil's Garden/Clear Lake Population Management Unit* in April, 2010. The strategy is intended to be viable for 20 years, with an annual review process. The working group established some specific goals and actions in chapter six of the strategy to address the sage-grouse population decline. The success of this conservation strategy depends on the continued cooperative partnership and participation among the agencies, organizations and private individuals identified in this strategy, as well as others who may join the effort in the future. Some measures have already been taken, such as translocations, grazing management adjustments, and juniper cutting, to improve sage-grouse numbers and habitat. The following actions that have been planned are habitat restoration and maintenance in areas occupied by sage-grouse, management of wildfire and livestock

grazing to maintain or enhance sage-grouse habitat, establishing a self-sustaining or increasing population of sage-grouse. Monitoring sage-grouse population parameters would provide the feedback to assess the effectiveness of the treatments.

The monitoring efforts for sage steppe and dry-forest treatments would focus on implementation and effectiveness monitoring. Implementation (short-term) monitoring would measure attributes that are a result of our treatments. This is an annual requirement that would serve as a baseline for our actions. It would include such measures as presence of invasive plant species, residual vegetation height, stream bank stability, riparian and upland vegetative communities, prescribed-fire intensity, and browse utilization. Effectiveness (long-term) monitoring occurs within three to five years of project implementation, and provides us with the information that determines if our treatments were effective in achieving the desired conditions. Monitoring requires the integration of multiple resources (e.g., range, wildlife, fisheries, and watershed). It is key in validating assumptions made in the development of project prescriptions. Dr. Richard Miller of Oregon State University would provide training and advice to the Modoc NF monitoring project manager.

A comparison and aggregation of data can be accomplished from the standardization of monitoring methodologies. A group of technical experts from a number of different entities developed a basic set of methods to address monitoring elements (Sage Steppe Ecosystem Restoration Strategy, Vegetation Monitoring Protocols 2009). These monitoring protocols include assessing noxious weeds, juniper, and other sage steppe vegetation. The implementation and coordination of such a monitoring strategy can be constrained by costs and available funding. The BLM Alturas Field Office staff, is coordinating monitoring and using the resulting data to address the overall sage steppe ecosystem restoration strategy. They have received funding to develop the data base for monitoring results for FY 11. Currently they are working with the USGS in this endeavor.

The monitoring conducted for the sage steppe treatments would be reported to a technical advisory committee as prescribed in the Sage Steppe FEIS Record of Decision. The results of the monitoring are to be used in a feedback loop for adaptive management to alter management prescriptions as needed.

NRCS and USFWS are partners in assessing and monitoring wildlife distributions, riparian conditions, range production, and health. CFLR funding would be used in part to augment the monitoring currently accomplished to determine project effectiveness of sage steppe treatments, especially those conducted in support of the NRCS Sage-Grouse Initiative.

The Modoc NF would monitor stream conditions as required by the North Coast Regional Water Quality Control Board. Also, the North Coast Regional Water Quality Control Board, the Central Valley Regional Water Quality Control Board, and the Lahontan Regional Water Quality Control Board require the Modoc NF to monitor adherence to the best management practices.

An integral piece of this initiative lies in use of treatment by-products through stewardship contracting, allowing wood product value to contribute to restoration treatments. To this end, the forest is working with Modoc County, North Cal-Neva Resource Conservation and Development, The Watershed Research and Training Center, and others to attract and develop industry infrastructure and alternative markets to reduce biomass transportation costs and support local economic development. With the successful multi-year implementation of this proposal, there would be opportunities for Modoc County to actively recruit a new facility within a short haul of CFLR restoration activities. Long-term stewardship restoration contracts with reliable product streams are a key feature of this strategy. The premise that this collaborative strategy is built on is simple: If we provide a dependable stream of restoration by-products (in this case, biomass) to the market, we

could attract investors to site a power plant, a pellet plant, or both, to the vicinity of Alturas. This facility would be closer to where treatments are occurring, thus reducing the cost of transporting biomass. When haul costs are reduced, restoration treatments that were previously done with service contracts costing the taxpayer an average of $300 per acre could be done with a forest products stewardship sale. These savings would allow us to restore more acres, while boosting the local economy and retaining valuable infrastructure and woodworking skills. By contrast, if we continue with our present program level, the number of acres we would be able to restore would gradually decrease over time as appropriated budgets decrease. The skilled workforce and infrastructure critical to managing land and resources would continue to decline.

Pretreatment monitoring in the dry forest would be accomplished by the forest silviculturist through the establishment of stand exams or by walk-through evaluations documented in writing in the stand record card (R5 form 2400-205). Pretreatment monitoring may also be accomplished by sale preparation personnel and documented in writing in the timber harvest activity record card – pre-sale data (R5 form 2400-202).

Posttreatment monitoring would be accomplished by either timber sale administrators, harvest inspectors, or contracting officer's technical representatives (COTR's) ensuring contractor compliance with contract specifications. Posttreatment monitoring inspections would be documented in writing on either contract daily diaries (FS form 6300-20) or timber sale administration inspection reports (R5 form 2400-181), and kept in their respective contract folders. Posttreatment monitoring may also be documented on the timber harvest activity record card – post sale data (R5 form 2400-202). The multiparty monitoring group would review the monitoring data to develop and recommend adaptive management measures.

Utilization

An integral piece of this initiative lies in use of treatment by-products through stewardship contracting, allowing wood product revenue to contribute to restoration treatments. Topography and other environmental factors provide the Modoc National Forest an advantage over other national forests in California: Most forest landscapes and vegetation types are well suited to whole-tree mechanical forest restoration treatments that can be followed up with prescribed underburning. Whole-tree mechanical logging produces biomass and small sawlogs.

The forest has a long history of proactive management that generates wood product for facilities in Modoc and adjacent counties. In recent years, the forest has been able to sell biomass and multiproduct timber sales for base rates. This generates little revenue, but saves the government approximately $350 to $450 per acre in acres treated. Additionally, the estimated market value resulting from proposed restoration treatments amounts to approximately $3 million in sawlog products and $12 million in biomass products over the next decade. This infusion of money would translate to a dramatic increase in business development and opportunities within the local communities.

Often, particularly in the case of sage steppe restoration, where the value of juniper removed does not cover costs, projects must be augmented with appropriated funding. Multi-product timber sale or stewardship contracts in the dry-forest system are generally in a better position economically. When packaged strategically, sawlog value can support removal and processing of biomass material. Where feasible, the forest would incorporate dryland forest projects with biomass projects to offset the low value of the material. Presently, haul costs, poor market conditions, and limited appropriated funding to implement projects significantly limit expansion of needed restoration treatments. There is overwhelming agreement among partners that the answer to accelerating

restoration and reducing cost of treatments is long-term stewardship contracting. A sufficient and guaranteed product stream would attract and support development of a local market for forest products. Haul costs are increasing and are the single greatest factor limiting the acres of restoration the forest can implement. A biomass or pellet plant located in the Canby-Alturas area closer to restoration treatments on national forests, BLM lands, and private lands would reduce haul costs, increase by-product use, and thereby increase product value. This would create local jobs and fuel more restoration treatments. It would be a positive feedback loop. Several feasibility studies for local power plant sitings have been completed, and one is underway in Klamath Falls, Oregon. Local public and private lands can easily provide sustainable product to support several small or one medium biomass or pellet facility—or both. But lack of guaranteed product stream over time is a major deterrent for investors.

Wood products from harvest activities on the forest currently go to facilities in (1) Bieber, California (c. 50 miles west of Alturas) where there is a 7-megawatt power plant, a post-and-pole operation, and sawmill with small- and large-log capacity; (2) Burney, California (c. 90 miles west of Alturas), which has three power plants and two sawmills; (3) Wendel, California (c. 90 miles south of Alturas), which has a 25-megawatt power plant, and (4) Klamath Falls, Oregon (c. 100 miles northwest of Alturas, which has an oriented strand board and co-generation facility. Susanville, California (c. 105 miles south of Alturas and Lakeview, Oregon (55 miles north of Alturas) both have biomass facilities planned, but they are not yet operational. Haul costs to all these facilities are too high to be economically feasible for most restoration treatments on the forest.

Providing a steady supply of wood chips would support local mills. Based on data collected on the BLM Alturas Field Office by their staff and a representative of the Watershed Research and Training Center, they estimated that 10,000 green tons of biomass per acre per year could be generated from BLM juniper stands (J. Jungwirth, personal communication to Mary Flores 16 Feb 2011). This value is consistent with what the Modoc NF could generate from areas proposed for biomass under this proposal.

The Modoc's 15-year average of 1,500 acres per year in biomass thinning-underburn-type restoration treatment in dry forest is significant, but represents only about five per cent of the dry-forest land base on the forest. We are fortunate to have regional markets for biomass; however, markets are too distant to support expanding treatments much beyond current accomplishments funding. Infrastructure investment is key to stretching limited partner and appropriated funding, and would increase restoration capacity over the long term. The forest is aggressively working with Modoc County, North Cal-Neva Resource Conservation and Development, The Watershed Research and Training Center, and others to develop industry infrastructure and alternative markets that would increase capacity and support local economic development. The Watershed Center is working on identifying technologies with the capacity to use 10,000 to 20,000 BDT per year. Using this technology, up to 13 jobs could be supported by a small (3-megawatt) biomass-powered pellet facility. This is a moveable pellet manufacturing system with the capacity to use 10,000 BDT tons per year and generates about $165 per ton gross revenue. Installation of a single Biojoule system could provide up to 13 jobs. Roughly the same amount of jobs could be supported by a small (3 megawatt) biomass facility. For every $1.00 spent in payroll, machinery, supplies for forest restoration and fuels reduction, and in the operating costs of the biomass and pellet plants, another $1.40 to $2.40 would circulate in the local economy (data from the Ecosystem Workforce Program, University of Oregon, 2010).

The forest typically averages a 50:50 split between sawlog and biomass output in any given year. However, the average percentage split over the next decade is projected to be 55 percent sawlog to

45 percent biomass. Mechanical whole-tree restoration treatments would generally remove excess conifers between 3 and 30 inches diameter at breast height, excluding old-growth juniper. Biomass stewardship contracts account for and use needles, limbs, and bole wood. Multi-product timber sales would generate sawlogs and biomass. In addition to biomass and sawlog use, firewood, post and pole, and other niche markets for forest products, i.e., juniper and cedar boughs, juniper collection for bonsai production, juniper processing for specialty applications, use restoration treatment by-products.

To treat fuels generated from these niche markets, the forest will use a juniper cutting prescription to either lop and scatter or pile and burn. Stand density would be the determining factor as to which prescription to use. Use of wood cutters would help in the reduction of fuel by removing any dried juniper boles that were cut and left. In turn, any fire allowed to burn in the cut areas to meet resource objectives would produce minimal smoke. The smoke emissions are shorter in duration and would not have major impacts to local communities due to the low population base of Modoc County.

Benefits to Local Economies

Providing a dependable stream of restoration by-products to a local power plant or pellet mill would create jobs in the local area. Wood products harvested on the forest now go to facilities in Bieber, Burney, and Wendel, California or Klamath Falls, Oregon for processing. Implementation of this project would make it economically feasible to build a plant closer to the biomass supply, by assuring a sufficiently large and constant flow of biomass material. Restoration activities would also be a source of jobs, i.e., crews to treat noxious weeds. Restoration would have other benefits, including the value of proactive preservation and enhancement of sage-grouse habitat and range allotments, reduced fire suppression costs, reduced forest health costs, and a net increase in local seasonal employment. The estimated net benefits of this restoration proposal would significantly exceed the anticipated costs.

Economic projection factors developed by the University of Oregon applied to our CFLR funding request, which averages $1,671,779 annually, projects that this project would create 25 jobs and an economic impact of $4,139,808 annually for the 10-year life of the project (The Employment and Economic Impacts of Forest and Watershed Restoration in Oregon, 2010). Scaling economic projections from a report to the Oregon Department of Energy for a 5-megawatt biomass plant, to the projected biomass stream that would be created by this project, results in an estimate of 27 jobs created (Biomass Resource Assessment and Utilization Options for Three Counties in Eastern Oregon, 2003). Results from the TREAT spreadsheet in attachment E show similar projections in creation of jobs.

All restoration treatments to be implemented in the sage steppe are designed to result in an increase in sage steppe grass, forbs, and brush species, resulting in a corresponding upward trend in overall range condition over time. Based on local research, forage production and quality increased eight- to ten-fold depending on the pretreatment plant composition and posttreatment management. Crude protein levels in desired range plants were 50 percent greater in cut, as compared to uncut, juniper woodlands. Ranching is one of the primary industries in Modoc County and providing forage over time would provide directly to community stability.

In addition, other restoration work such as noxious weed treatments and watershed restoration activities would generate jobs. A number of temporary employees work with the Modoc NF resource specialists to perform surveys that are the basis of the analysis for treatments activities. The augmentation of the Modoc NF's budget with CFLR implementation and monitoring funds

would enable the forest to expand employment opportunities to local individuals and businesses. When stewardship and service contracts are employed, the forest would use best-value criteria to award contracts. This would allow the forest to give preference to local contractors and to outside contractors who hire from the local work force. If this proposal is accepted, the forest contracting department would set up a training workshop to help local contractors with questions pertaining to submission of contract bids. This includes both local contractors from Modoc County, as well as contractors from surrounding communities. Contracts by NRCS permittees that would be funded under the NRCS Sage-Grouse Initiative would also provide additional jobs.

A local contractor pool could compete for the projects funded through the CFLR proposal: equipment operators, rock and gravel suppliers, timber fallers, and others. It would also stimulate formation of new businesses, adding to the local contractor pool.

The forest has an agreement with the Pit River Tribe that could be the vehicle for providing job training and development programs that could result from implementing restoration work. Restoration work would also include plantings of culturally important native plant species, using container stock produced at the Mount Shasta Nursery. This agreement would also be used for herbicide treatment on noxious weeds on the forest, which would enable the tribe to maintain a weed crew for its own lands while providing additional job opportunities. Past accomplishments include noxious weed removal, fence building, native tobacco restoration, and fuels reduction treatment.

The Modoc Economic Development Committee, a local non-profit organization leading community efforts to revitalize the local economy, supports recreation and tourism as an important component of the local economy. Many community businesses rely on visitors to the area to make their businesses viable. Implementation of this project would enhance the recreation opportunities and cause a potential increase in visitor use. Restoration of the sage steppe ecosystem would create a more park like setting visually pleasing to visitors. Additionally, viewing wildlife is recognized as a primary use of the forest; the restoration would improve habitat, thereby increasing the probability of visitors encountering wildlife.

Additionally, the forest has proposed to establish the Cedar Pass Children's Forest (CPCF) located within the project boundary. The primary component of the CPCF would be an outdoor education program that would offer place-based, experiential learning in the forest environment. The project would expand each year and has the capacity to serve more than 900 students grades K-12. Forest staff is partnered with the local school districts, a local charter school, natural resource agencies, and community groups to expose students to service and learning projects that meet state standards. In this way, students learn about forest succession and ecology, forest management, range management, fisheries, wildlife, geology, and recreation.

This proposal outlines a strategy to accomplish approximately 297,000 acres of restoration in sage steppe and dry forest that would generate a dependable stream of a wood products through long-term stewardship contracts necessary to attract investment in a local biomass or wood pellet facility. The requirements and technology associated with mechanical removal for biomass and sawlogs is a well-established, proven methodology on the forest, and is the basis of our vegetation management program now.

This approach is integral to this strategy. Treatments would generate products that would offset some, but far from all, of the restoration costs. Partner funding, appropriated funding, and wood product and bioenergy markets determine the extent of treatment opportunities on the Modoc National Forest. Since the Modoc National Forest funding levels are static to decreasing, it is even

more critical to develop sustainable partnerships and product use opportunities. Development of local markets would reduce the cost of and expand future restoration treatments as well as reduce future fire-suppression costs. With added industry capacity, additional jobs and job training opportunities would be created.

Once there are local outlets for products from restoration activities, future implementation costs are expected to decrease. In addition, there would be a corresponding decrease in fire-suppression costs; see the Fire section for specifics. Restoration projects using biomass and small log material would increase and sustain local employment opportunities. A steady stream of biomass material would better attract potential investors in developing a local pellet plant. For the past 13 years, a portable sawmill operator (Specialized Lumber), based in Alturas, has used juniper trees to mill logs into floor, ceiling, and fencing products. An increase in material supply would allow small operations like this to expand and increase employment opportunities to the local work force.

There are opportunities as well to increase community stability by offering employment to youth working on various aspects of restoration. The River Center (Alturas) would employ and train youth for native seed collection. The Youth Conservation Corps could help with the restoration activities that use hand-held equipment. Youth from the Cedarville Indian Rancheria are expected to assist with native plant restoration through an agreement with Cultural Advocates for Native Youth.

Small-business opportunities have far-reaching benefits for our communities outside of simply employment. A local contractor who has been awarded juniper contracts on the forest produces juniper sawlogs and sells them to REACH, Inc. in Klamath Falls, Oregon. REACH, Inc., a non-profit organization, promotes equality and acceptance of people with disabilities; they produce juniper wood products such as decking, landscape bark, flooring, square posts, peeled poles, paneling, and lumber. Their goal is to teach skills to people with disabilities, so that they can be productive members of society. The partnership that REACH has built with the community is aimed at encouraging the growth and development of these relationships.

Implementation of restoration activities has a ripple effect by allowing for the education of forest users and the public as a whole. Working with The River Center (Alturas) to collect native seed is a prime example of how holistic restoration activities benefit partners across the focal area. The River Center is a local, nonprofit organization whose mission is to foster natural-resource stewardship and promote the sustainability of the local community. They are able to reach audiences through hands-on training programs like their natural resources summer camp, school field trips, and their interpretative displays at their visitor, interpretive, and resource center. They are an invaluable partner in providing education about the restoration efforts that the federal agencies are engaged in, and the environmental, social, and economic benefits from these activities.

The Modoc County Resource Advisory Committee also funded the creation of interpretative panels in coordination with the Highway 139 Ecosystem Restoration Project. The panels, in part, describe watershed and habitat improvement projects; the habitats consist of sage steppe, aspen, and black oak. One panel details the changes that juniper expansion has had on the function of these systems and the importance of treatment. These handicapped-accessible panels and pullouts are located on one of the busiest byways on the Modoc National Forest. We expect them to enhance understanding of restoration efforts for all levels of cognitive abilities and visitor capabilities. The Modoc NF expects to have the fabricated panels in place by early summer 2011 and to begin using the site at Howard's Gulch Campground as an outdoor classroom with its various partners.

The impending end to Secure Rural School funding will place an additional burden on county government. Consequently, the county is becoming proactive in seeking opportunities to create new

jobs and retail sales, thereby generating a new revenue stream for the operation of county government. The county views this CFLR proposal as having the potential to help do all of these.

With the successful implementation of this proposal there would be opportunities for the county to be an active recruiter of a new facility within a short haul of CFLR restoration activities. The use of long-term contracts or agreements, perhaps even partially held by the county, would go a long way in surmounting the largest obstacle to building a facility—the uncertainty of supply. In addition, with the supply questions answered, the county would have an option to seek a portion of the construction capital through various lending sources available only to government entities. This would allow a portion of the income to return directly to the county to provide needed services for its citizens.

Funding Plan

Multiparty monitoring is increasingly important as federal budgets have the potential to decrease. By pooling our efforts, partners can bring different resources to the table, including alternative funding sources to aid in the monitoring program. The sage steppe monitoring program is still in its beginning phases. In FY 2010 and 2011, the Alturas BLM Office provided salary time and additional money from their state office to develop the database for the sage steppe monitoring results. When one takes into account the difficulties in developing a platform that can be accessed and populated by several different agencies, one realizes the momentous task that is before the various partners in this effort.

CFLR funds would be used to provide in part the baseline and implementation monitoring field data to help support the sage steppe and dry-forest monitoring on National Forest System lands. Pending CFLR funding, the USFS would also provide funding to USFWS to expand their sage-grouse monitoring efforts currently conducted on USFS system lands. Eight percent of the CFLR request would support monitoring efforts. These funds are captured in attachment F, row 2, The Match from the Modoc NF and row 10, the Total CFLR Request.

A wide variety of federal investments are planned, and in some cases have been implemented, both by the Modoc National Forest and its various partners: grade and water control structures to restore wet-meadow hydrology (NRCS); prescribed fire (USFS and BLM); juniper thinning (all); fencing to enhance wildlife habitats (all); planting and establishment of native vegetation—grasses, forbs, shrubs and conifers (USFS and NRCS with their partners); conifer thinning (USFS); wildlife guzzler installation (USFS & sportsmen's groups); and greater sage-grouse habitat improvement (all).

Livestock permittees have improved their private lands within the forest boundary, developing and fencing springs, constructing stock ponds, and planting willows. Others have worked with the local resource conservation districts to treat noxious weeds on their various private lands. Since components of ecosystems such as plants and animals cross ownership boundaries, these improvements enhance ecosystem function across the entire landscape. However, neither these non-federal investments nor the USFWS Partners in for Fish and Wildlife were included in the following attachments.

Inherent in the NRCS sage-grouse initiative funds is the 25 percent non-federal match provided by participating permittees. Those matching dollars help fund the same types of projects mentioned above. The additional 75 percent NRCS match constitutes the largest share of the partner in-kind seen in the executive summary, attachment A, and attachment F. As directed, however, this match and other partner funds (e.g., Modoc County RAC, USFWS Klamath Falls Office) were not used in attachment E, so the benefit to the economy as well as the projected development of jobs does not reflect the total ripple effect by implementation of the CFLR proposal.

Attachment A - Table of Projected Accomplishments

Performance Measure	*Code*	*Number of units to be treated over 10 years using CFLR funds*	*Number of units to be treated over 10 years using other FS funds*	*Number of units to be treated over 10 years using Partner Funds*	*CFLR funds to be used over 10 years*	*Other FS funds to be used over 10 years*	*Partner funds to be used over 10 years*
Acres treated annually to sustain or restore watershed function and resilience	WTRSHD-RSTR-ANN	1000	1600	200	500000	800000	100000
Acres of forest vegetation established	FOR-VEG-EST	250	250	10	60000	60000	10000
Acres of forest vegetation improved	FOR-VEG-IMP	50000	50000	6000	5273000	5273000	900000
Manage noxious weeds and invasive plants	INVPLT-NXWD-FED-AC	3,693	307	0	2,404,150	200,000	0
Highest priority acres treated for invasive terrestrial and aquatic species on	INVSPE-TERR-FED-AC						

Performance Measure	***Code***	***Number of units to be treated over 10 years using CFLR funds***	***Number of units to be treated over 10 years using other FS funds***	***Number of units to be treated over 10 years using Partner Funds***	***CFLR funds to be used over 10 years***	***Other FS funds to be used over 10 years***	***Partner funds to be used over 10 years***
NFS lands							
Acres of water or soil resources protected, maintained or improved to achieve desired watershed conditions.	S&W-RSRC-IMP	See WTRSHD-RSTR-ANN	See WTRSHD-RSTR-ANN	3000	See WTRSHD-RSTR-ANN	See WTRSHD-RSTR-ANN	2,482,400
Acres of lake habitat restored or enhanced	HBT-ENH-LAK						
Miles of stream habitat restored or enhanced	HBT-ENH-STRM	5.3	10.7	4	200,000	400,000	150,000

Performance Measure	***Code***	***Number of units to be treated over 10 years using CFLR funds***	***Number of units to be treated over 10 years using other FS funds***	***Number of units to be treated over 10 years using Partner Funds***	***CFLR funds to be used over 10 years***	***Other FS funds to be used over 10 years***	***Partner funds to be used over 10 years***
Acres of terrestrial habitat restored or enhanced	HBT-ENH-TERR	See RG-VEG-IMP & FP-FUELS-NON-WUI	See RG-VEG-IMP & FP-FUELS-NON-WUI	18,140	See RG-VEG-IMP & FP-FUELS-NON-WUI	See RG-VEG-IMP & FP-FUELS-NON-WUI	298,600
Acres of rangeland vegetation improved	RG-VEG-IMP	20,500	6,260	27,265	6,104,000	280,000	2,629,170
Miles of high clearance system roads receiving maintenance	RD-HC-MAIN						
Miles of passenger car system roads receiving maintenance	RD-PC-MAINT						
Miles of road decommissioned	RD-DECOM						
Miles of passenger car system roads improved	RD-PC-IMP	1000	2000		800,000	3,500,000	

Performance Measure	***Code***	***Number of units to be treated over 10 years using CFLR funds***	***Number of units to be treated over 10 years using other FS funds***	***Number of units to be treated over 10 years using Partner Funds***	***CFLR funds to be used over 10 years***	***Other FS funds to be used over 10 years***	***Partner funds to be used over 10 years***
Miles of high clearance system road improved	RD-HC-IMP						
Number of stream crossings constructed or reconstructed to provide for aquatic organism passage	STRM-CROS-MTG-STD						
Miles of system trail maintained to standard	TL-MAINT-STD						
Miles of system trail improved to standard	TL-IMP-STD						
Miles of property line marked/maintained to standard	LND-BL-MRK-MAINT						

Performance Measure	Code	Number of units to be treated over 10 years using CFLR funds	Number of units to be treated over 10 years using other FS funds	Number of units to be treated over 10 years using Partner Funds	CFLR funds to be used over 10 years	Other FS funds to be used over 10 years	Partner funds to be used over 10 years
Acres of forestlands treated using timber sales	TMBR-SALES-TRT-AC	37500 (subset of forest vegetation improved)	37500 (subset of forest vegetation improved)	0	See FOR-VEG-IMP	See FOR-VEG-IMP	See FOR-VEG-IMP
Volume of timber sold (CCF)	TMBR-VOL-SLD	179990	179990	0	See FOR-VEG-IMP	See FOR-VEG-IMP	See FOR-VEG-IMP
Green tons from small diameter and low value trees removed from NFS lands and made available for bio-energy production	BIO-NRG	201000	201000	0	See FOR-VEG-IMP	See FOR-VEG-IMP	See FOR-VEG-IMP
Acres of hazardous fuels treated outside the wildland/urban interface (WUI) to reduce the risk of catastroph	FP-FUELS-NON-WUI	10000	10000	3000	See FOR-VEG-IMP	See FOR-VEG-IMP	See FOR-VEG-IMP

Performance Measure	Code	Number of units to be treated over 10 years using CFLR funds	Number of units to be treated over 10 years using other FS funds	Number of units to be treated over 10 years using Partner Funds	CFLR funds to be used over 10 years	Other FS funds to be used over 10 years	Partner funds to be used over 10 years
ic wildland fire							
Acres of hazardous fuels treated inside the wildland/urban interface (WUI) to reduce the risk of catastrophic wildland fire	FP-FUELS-NON-WUI	3330	670	0	See FOR-VEG-IMP	See FOR-VEG-IMP	See FOR-VEG-IMP
Acres of wildland/urban interface (WUI) high priority hazardous fuels treated to reduce the risk of catastrophic wildland	FP-FUELS-WUI						

Performance Measure	Code	Number of units to be treated over 10 years using CFLR funds	Number of units to be treated over 10 years using other FS funds	Number of units to be treated over 10 years using Partner Funds	CFLR funds to be used over 10 years	Other FS funds to be used over 10 years	Partner funds to be used over 10 years
fire							
Number of priority acres treated annually for invasive species on Federal lands	SP-INVSPE-FED-AC	25 (a subset of acres shown above as treated for invasives plants)	25 (a subset of acres shown above as treated for invasives plants)	0	30,000	10,000	0
Number of priority acres treated annually for native pests on Federal lands	SP-NATIVE – FED-AC						

Assumptions for Attachment A: The Forest made the following assumptions when filling out Attachment A. 1) The rangeland vegetation improved (RG-VEG-IMP) included the lands where juniper encroachment is beginning as well as those stands that have significant juniper overstory, but sufficient native understories to warrant treatment. Junipers encroaching into pine stands are included in FOR-VEG-IMP. 2) The planting acres (FOR-VEG-EST) represented an average program, where there is no need to plant after a large stand replacing events. 3) The FOR-VEG-IMP included the following vehicles for treatment: pre-commercial thinning, commercial timber sales, pruning, and underburning. 4) S&W-RSRC-IMP included roads improved utilizing Legacy funding. Other watershed treatments are included in the WTRSHD-RSTR-ANN. 5) Noxious weed management (INVPLT-NXWD-FED-AC) consists of sites that needed multiple treatments to control, contain, or eradicate weed occurrences. 6) Acres of terrestrial habitat (HBT-ENH-TERR) includes: rangeland vegetation acres (which were developed as part of the Sage Grouse Initiative), sensitive plant enhancement, and wildlife habitat improvement projects such as guzzler installation and aspen enhancement. There

are acres that improve terrestrial wildlife habitat, such as prescribed fire acres that were implemented in partnership with Rocky Mountain Elk Foundation, that are included in other rows and not in this one. 7) The TIMBR-VOL-SLD row includes both sawlog and biomass. 8) The FP-FUELS-NON-WUI row includes rx burn acres only and not acres where mechanical treatments were used to decrease fuels; those are captured in the FOR-VEG-IMP row. 9) Partnership monies were estimated based on the levels that the Forest has historically received or expectations of funds from partners (like NRSC Sage Grouse Initiative). They include both partnership funds and in-kind match as categorized in Attachment F. 10) SP-INVSPE-FED-AC shows weed treatments near TESW plants or other resource concerns.) Monitoring costs are reflected in attachment F.

Attachment B – Results – "Cost Savings" of the R-CAT Spreadsheet

(Includes documentation of data sources and assumptions used to populate the table—begins next page.)

R-CAT Results

Proposal Name: Sage Steppe and Dry Forest Restoration on the Modoc Plateau

Start Year		2011
End Year		2019
Total Treatment Acres		274,583.00
Average Treatment Duration		20
Discounted Anticipated Cost Savings - No Beneficial Use	**$**	**(20,239,510)**
Discounted Anticipated Cost Savings - Low Beneficial Use	$	(7,073,297)
Discounted Anticipated Cost Savings - Moderate Beneficial Use	$	6,092,917
Discounted Anticipated Cost Savings - High Beneficial Use	$	14,870,393

Start year rationale: 2011	Documentation Page
This page is intended to help you record and communicate the assumptions and calculations that feed the risk and cost analysis tool package spreadsheet	**Response / Information Column**
Was the analysis prospective (projecting activities, costs and revenues that are planned by the proposal) or retrospective (using actual acres, revenues and costs in an analysis looking back over the life of the project)?	**Retrospective, future markets and cost are nearly impossible to predict.**
Start year rationale:	2011 Start year for ongoing projects planned.
End year rationale:	2019 Final year for projects planned.
Duration of treatments rationale:	Treatments are good for 20 years due to lack of moisture and growing season length.
All dollar amounts entered should reflect undiscounted or nominal costs, as they are discounted automatically for you in the R-CAT spreadsheet tool? Did you provide undiscounted costs, and in what year data are your costs and revenues provided.	All costs have been computed from most recent data and not discounted. Revenue is predicted from past sales but is influenced greatly on market conditions. Costs are based on current projects occurring on the forest.
Average treatment cost per acre rationale:	Took into consideration all costs associated with implementation of on the ground cost. This includes burning, hand piles, marking/prep, botany surveys and archeology surveys. Costs for the entire treatment area were figured and then spread out for every acre of the treatment area. Hand piling juniper is the high cost of the proposal.
Rationale for actual costs per acre of treatment by year is used:	There is no good manner to predict the actual cost for treatment for the entire treated acres. The pine dry forest has potential revenue in those treatments where the juniper has very little value. The cost are based on projected cost per acre and spread over the entire acres treated. See spreadsheet to document how costs where allocated.
Average treatment revenue per acre rationale:	Primary revenue is from the dry forest pine. Total potential revenue was figured by current and expected sales and volumes. This revenue was then totaled and spread over the entire treatment area. Additionally we looked at all current fuel wood sales and projected them into this model.

This tool is intended to be used to estimate Forest Service fire program costs only, did you conduct your analysis this way or have you taken an all lands approach?	All lands Approach.
Total treatment acres calculations, assumptions:	Total acres is the area predicted to be treated.
Treatment timing rationale with NEPA analysis considerations:	The number of acres each year are the predicted acres NEPA will be completed to allow implementation.
Annual Fire Season Suppression Cost Estimate Pre Treatment, Assumptions and Calculations	Small fire costs were from 2001 to 2006 fire seasons.
Did you use basic Landfire Data for you Pretreatment Landscape?	We used the California Fuels Landscape (updated 08/27/2010) developed by the Pacific Strategic Support Cache.
Did you modify Landfire data to portray the pretreatment landscape and fuel models?	We used the California Fuels Landscape (updated 08/27/2010) developed by the Pacific Strategic Support Cache, Since this dataset is updated yearly
Did you use ArcFuels to help you plan fuel treatments?	No, interactions with collaborators and Interdisciscplinary team members.
Did you use other modeling to help plan fuel treatments, if so which modeling?	We used the Landscaped Editor function in the Wildland Fire Decision Support System (WFDSS) to simulate the treatment prescriptions, then the Fire Spread Probability model in WFDSS to test the post treatment landscape and derive the percent reduction of the probable area burn. The analysis used 3 days for the duration of the 500 fire simulations under average Energy Component (ERC) for August 15th. Data used was the 082710 version of the California Fuels Landscape (.LCP) at 120 meter resolution. Ignition files used were points on a 5,000 meter grid within the project boundary. Analyst: Phil Bowden
Did you model fire season costs with the Large Fire Simulator?	No, Because of time constraints we did not. .
If, so who helped you with this modeling?	Phil Bowden
If not, how did you estimate costs, provide details here:	Cost were averaged from 2001-2006 fire season.
Did you apply the stratified cost index (SCI) to your Fsim results?	No, we used FSPro.
Who helped you apply SCI to your FISH results?	

Did you filter to remove Fsim fires smaller than 300 acres and larger than a reasonable threshold?	
What is the upper threshold you used?	
Did you use median pre treatment costs per fire season?	Yes
Did you use median post treatment costs per fire season?	Yes, adjust from our average pre treatment fire season discounted by our change in FSPro pre and post runs.
Did you test the statistical difference of the fire season cost distributions using a univariate test?	No
What were the results?	5347 acres per year at a 13% change expressed in the FSPro runs.
Did you estimate Burned Area Emergency Response (BAER) costs in you analysis?	Previous experience and fires show that about .05% of the fire cost is BEAR.
Did you use H codes or some other approach to estimate these costs?	No
Did these cost change between pre and post treatment?	Yes
Did you estimate long term rehabilitation and reforestation costs in your analysis?	No
How did you develop these estimates, and did these cost change between pre and post treatment?	We figured 5% of our Pre and Post treatment cost of suppression.
Did you include small fire cost estimates in your analysis?	Yes, used the years of 2001-2006 for small fire costs.
If so, how did you estimate these costs, what time period is used as a reference, and did these cost change between pre and post treatment?	Averaged true fire cost thru 2001-2006.

Did you include beneficial use fire as a cost savings mechanism in your analysis?	Yes, Opportunity to use Fire for Resource Benefit in areas that Have NEPA Coverage was considered.
How did you estimate the percent of contiguous area where monitoring is an option for pretreatment landscape?	We have areas that are covered in the Forests Fire Management Plan.
How did you estimate the percent of contiguous area where monitoring is an option for post treatment landscape, and why did you select the percentage of your landscape for low, moderate and high?	We used Fire Management estimation in deciding the probability of managing fire in terms of achieving resource benefit in the varying circumstances.
How did you derive an estimate for the percentage of full suppression costs used in fire monitoring for beneficial use?	Reduction in suppression resources needed to suppress fire and type s of resources required to monitor said fire.
Did you ensure that you clicked on all the calculation buttons in cells in column E after entering your estimates?	Yes,
Did you make any additional modifications that should be documented?	

Modoc NF – Sage Steppe and Dry-Forest on the Modoc Plateau Project

Methodology for Fire Spread Probability Model (FSPro) analysis

Fire Spread Probability (FSPro) Modeling:

1. Test the fuels landscape with different lengths of fire simulations: 7 day and 3 day simulation were tested. The goal of this testing was to find the simulation duration that analyzes the post treatment landscape adequately without being so long that the simulated fires have ample time to burn through the treatment area even if the treatment area slows fire spread significantly. Eventually a turtle gets to the finish line if given enough time. The 3 day simulation duration was selected.
2. Due to time constraints The FSPro model in WFDSS was used to test both the pre & post treatment landscapes instead of the preferred Fire Behavior Simulator (FSim).
3. ArcMap GIS was use to clip the FSPro pre & post treatment raster outputs to the project area.
4. Then to derive the percent reduction of the probable area burned these outputs were compared.
5. This percent reduction can be applied to the historic acreage burned for the area and then used in the R-Cat spreadsheet.

Fire Simulation Inputs

Weather Station: Rush Creek RAWS
Fuel Moisture Data: The average Energy Component (ERC) for August 15th 3/20 – 11/01/1997 - 2010
Fire Simulation duration: 3 days
Number of Fire Simulations: 500
Winds: Gusts & Ten minute average 7/01 – 10/15/1997 - 2010
Simulated Ignition: Points on a 5,000 meter grid located within the project boundary were used.
Analyst: Phil Bowden (916)640-1119 pbowden@fs.fed.us

Pre-treatment Spatial Fuels Attributes

The 08/27/2010 version of California Fuels Landscape (.LCP) developed by the Pacific Southwest Region's Strategic Support Cadre at 120 meter resolution was used because it has modeled past wildfire behavior in the local area very adequately. This dataset is also updated yearly and did not have to be modified for recent treatments and wildfires. The California Fuels Landscape is derived from the existing vegetation (CALVEG) dataset. Information on this dataset can be found at: http://www.fs.fed.us/r5/rsl/clearinghouse/forest-eveg.shtml

Post-treatment Spatial Fuels Attributes

The Modoc National Forest's Fuels and Vegetation Management Staff provided GIS Shape files with which assigned landscape modifications for the simulated treatments. These modifications were put into the following 3 groups:

Shape File Name	Fuel Model	Canopy Base Height	Canopy Bulk Density	Canopy Cover
Forest Units	If TUorTL then 183	Set to 9.0 meters	Multiply by 0.70	Multiply by 0.70
Sage Steppe CBH 14	122	If <= 4.0m set 4.0m	Multiply by 0.2	Multiply by 0.2
Sage Steppe CBH5	122	If <= 1.8m set 1.8m	Multiply by 0.1	Multiply by 0.1

The Landscaped Editor function in the Wildland Fire Decision Support System (WFDSS) was then used to simulate these treatment prescriptions on the pre-treatment California Fuels Landscape (.LCP).

Fire Spread Probability (FSPro) Modeling Limitations

Fire spread only is modeled and there are no outputs for the probability of other fire behavior attributes such as flame length, fire type, and fire line intensity.

Unlike the preferred Fire Behavior Simulator (FSim) FSPro does not simulate the probability of fire ignitions happening. Due to this fact the pre and post treatment acreage change is quite arbitrary and should not be used as an input into the R-CAT spreadsheet.
Also point ignitions on a 5,000 meter grid may not adequately test the posttreatment landscape.
Variations in the wind & ERC scenarios between the pre & post treatment simulations will also contribute to changes in burn probabilities. The high number of fire simulations (500) should reduce the effects from this variation.

Attachment C - Members of the Collaborative

Organization Name	*Contact Name*	*Phone Number*	*Role in Collaborative*
BLM - Surprise Field Office (Cedarville, CA)	Allen Bollschweiler & Garth Jeffers	530-279-6101	Implementation & monitoring
BLM-Alturas Field Office (Alturas, CA)	Tim Burke	530-233-4666	Implementation & monitoring
Klamath Basin National Wildlife Refuge (Tulelake, CA)	Ron Cole	530-667-2231	Implementation & monitoring
Modoc County-Resource Analyst (Alturas, CA)	Sean Curtis	530-233-3276	Planning & Coordination
Modoc NF	***Kimberly Anderson***	***530-233-5811***	Integrated in all phases
Modoc Vitality Working Group (Alturas, CA)	Dwight Beeson & James Cavasso	530-233-1999	Advisor for economic stability
NRCS – Alturas Field Office (Alturas, CA)	Matt Drechsel	530-233-4137	Integrated in all phases
NRCS – Tule lake Field Office (Tulelake, CA)	David Ferguson	530-667-4247 x102	Integrated in all phases
Oregon State University (Corvallis, OR)	Dr. Richard Miller	541-737-1622	Advisor -monitoring
Pit River Conservation District (Adin, CA)	Buck Parks	530-299-3178	Integrated in all phases
Pit River Watershed Alliance (Alturas, CA)	Stacey Hafen	530-233-8871	Integrated in all phases

Resource Conservation District – Central Modoc (Alturas, CA)	Kate Hall	530-233-8878	Integrated in all phases
Resource Conservation District –Lava Beds-Butte Valley (Tulelake, CA)	Mike Byrne	530-667-4247x110	Integrated in all phases
The River Center (Alturas, CA)	Valerie Lantz	530-233-5085	Native Grass Seed Collection and education

Attachment D – Letter of Commitment

Forest Service
Modoc National Forest
800 West 12th Street
Alturas, CA. 96101
(530) 233-5811
TTY (530) 233-8708

File Code: 1930/2400
Route To: ((2020))

Date: February 8, 2011

Subject: Modoc NF - FY 2011 Attachment D for CFLR

To: Regional Forester

The Modoc National Forest and its myriad partners, who have common goals to provide both resilient ecosystems and sustainable communities, are seeking opportunities to expand the collaborative restoration currently underway across northeastern California. This work involves enhancing livestock grazing opportunities, while restoring sage-grouse habitat in sage steppe systems that have been degraded by changes in fire regimes. In addition, treatments in the dry-forest systems would provide a steady stream of goods to sustain current mills and develop additional local markets; these efforts are intended to increase treatment efficiency, while decreasing costs. The cumulative effect of vegetation treatments would restore ecosystem resiliency, thereby decreasing potential resource loss due to wildfire.

Working with our various partners, we are truly striving to implement the "All Lands Approach," realizing that is our best hope for continued success in the future. These partners are actively engaged in all phases of projects – from helping develop grants to fund the planning efforts through post-project monitoring.

The following collaborators are providing signatures in support of the Modoc National Forest's ten-year, multifaceted project Collaborative Forest Landscape Restoration Project. The signature page included with this letter is to fulfill the requirements for attachment "D" in the FY 2011 grant proposal. If you have any questions concerning this proposal, please contact me at (530) 233-8700 or Mary Flores at (530) 279-6116. Thank you for your time and consideration.

Kimberly H Anderson

KIMBERLY H. ANDERSON
Forest Supervisor

Enclosure

Modoc National Forest Collaborative Forest Landscape Restoration Signatures of Commitment

We, the undersigned, are in collaboration with the Modoc National Forest and are committed to aiding their efforts to restore sage steppe and dry forest ecosystems as proposed in their Collaborative Forest Landscape Restoration Program grant proposal. The activities on the Modoc National Forest enhance the restoration treatments occurring across our various ownerships and with our organizations.

Name	Organization	Date	Signature
Kate Hall Watershed Coordinator	Central Modoc Resource Conservation District	2/8/2011	
ALLEN BOLLSCHWEILER FIELD OFFICE MANAGER	BLM	2/8/11	
Matt Drechsel District Conservationist	NRCS	2/8/11	
Stacey HAFEN DIR. OF ADMIN. SVCS	North CAL-NEVA RC&D & Pit River Watershed Alliance	2-8-11	
SEAN CURTIS Resource Analyst	MODOC COUNTY	2-8-11	
Tim Burke Field Manager	BLM Alturas	2/11/11	
Valerie Lantz Executive Director	The River Center	2-11-11	
C. Dwight Beeson	Modoc Vitality Working Group Plumas Bank	2-11-11	

Please send the signed page to Warner Mountain Ranger District, PO Box 220, Cedarville, CA 96104, Attention: Mary Flores or FAX to 530-279-8309, Attention: Mary Flores.

Modoc National Forest Collaborative Forest Landscape Restoration Signatures of Commitment

We, the undersigned, are in collaboration with the Modoc National Forest and are committed to aiding their efforts to restore sage steppe and dry forest ecosystems as proposed in their Collaborative Forest Landscape Restoration Program grant proposal. The activities on the Modoc National Forest enhance the restoration treatments occurring across our various ownerships and with our organizations.

Name	Organization	Date	Signature
Michael Byrne	Lava Beds Butte Valley RCD	2/8/11	Michael Byrne
Ru Cole	KBNWRC	2/8/11	Ru Cole

Please send the signed page to Warner Mountain Ranger District, PO Box 220, Cedarville, CA 96104, Attention: Mary Flores or FAX to 530-279-8309, Attention: Mary Flores.

FEB-16-2011 03:05P FROM:RANGELAND ECOLOGY AN (541) 737-0504 TO:915302798309P8486282P.1/1

Modoc National Forest Collaborative Forest Landscape Restoration Signatures of Commitment

We, the undersigned, are in collaboration with the Modoc National Forest and are committed to aiding their efforts to restore sage steppe and dry forest ecosystems as proposed in their Collaborative Forest Landscape Restoration Program grant proposal. The activities on the Modoc National Forest enhance the restoration treatments occurring across our various ownerships and with our organizations.

Name	Organization	Date	Signature
Richard Miller	Oregon State University	2/16	

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Modoc National Forest Collaborative Forest Landscape Restoration Signatures of Commitment

We, the undersigned, are in collaboration with the Modoc National Forest and are committed to aiding their efforts to restore sage steppe and dry forest ecosystems as proposed in their Collaborative Forest Landscape Restoration Program grant proposal. The activities on the Modoc National Forest enhance the restoration treatments occurring across our various ownerships and with our organizations.

Name	Organization	Date	Signature
David F. Ferguson	NRCS	2/9/2011	
Dale Cone	DFG	2/9/11	
Edward Ward	Pit River R Rod & Gun Club	2/9/11	
Buck Parks	Pit RCD	2/9/11	

Please send the signed page to Warner Mountain Ranger District, PO Box 220, Cedarville, CA 96104, Attention: Mary Flores or FAX to 530-279-8309, Attention: Mary Flores.

Attachment E – TREAT Spreadsheet

Detailed Average Annual Impacts Table (For CFLR Fund Contributions Only)

	Employment (# Part and Full-time Jobs)			Labor Inc (2010 $)		
	Direct	Indirect and Induced	Total	Direct	Indirect and Induced	Total
Thinning-Biomass: Commercial Forest Products						
Logging	52.9	63.0	115.9	2,579,025	3,196,982	5,776,007
Sawmills	25.2	48.3	73.5	1,366,009	2,118,906	3,484,915
Plywood and Veneer Softwood	-	-	-	-	-	-
Plywood and Veneer Hardwood	-	-	-	-	-	-
Oriented Strand Board (OSB)	-	-	-	-	-	-
Mills Processing Roundwood Pulp Wood	-	-	-	-	-	-
Other Timber Products	0.7	0.8	1.5	26,561	36,709	63,270
Facilities Processing Residue From Sawmills	5.0	11.5	16.6	382,483	576,138	958,621
Facilities Processing Residue From Plywood/Veneer	-	-	-	-	-	-
Biomass--Cogen	2.9	1.9	4.7	263,287	142,623	405,911
Total Commercial Forest Products	**86.7**	**125.6**	**212.2**	**4,617,366**	**6,071,358**	**10,688,724**
Other Project Activities						
Facilities, Watershed, Roads and Trails	0.0	0.0	0.0	0.0	0.0	0.0
Abandoned Mine Lands	0.0	0.0	0.0	0.0	0.0	0.0
Ecosystem Restoration, Hazardous Fuels, and Forest Health	0.0	0.0	0.0	0.0	0.0	0.0
Commercial Firewood	5.0	1.0	6.1	91,982.4	55,937.8	147,920.1
Contracted Monitoring	0.0	0.0	0.0	0.0	0.0	0.0
Total Other Project Activities	**5.0**	**1.0**	**6.1**	**91,982**	**55,938**	**147,920**
FS Implementation and Monitoring	**39.7**	**9.9**	**49.5**	**1,155,467**	**499,721**	**1,655,188**
Total Other Project Activities & Monitoring	**44.7**	**10.9**	**55.6**	**$1,247,449**	**$555,659**	**$1,803,108**
Total All Impacts	**131.4**	**136.5**	**267.8**	**$5,864,815**	**$6,627,017**	**$12,491,832**

Attachment F-Funding Estimates

Fiscal Year 2011 Funding Type	Dollars Planned
1. FY 2011 funding for implementation:	4,517,461
2. FY 2011 funding for monitoring	52,600
3. USFS appropriated funds:	2,377,000
4. USFS permanent & trust funds:	423,000
5. Partnership Funds	135,000
6. Partnership In-Kind Services Value (NRCS-Alturas & Tulelake)	1,345,571
7. Estimated Forest Product Value	41,250
8. Other (specify) Legacy Funds	248,240
9. FY 2011 Total (total of 1-6 above for matching CFLRP request)	4,570,061
10. FY 2011 CFLRP request (must be equal to or less than above total)	1,614,715
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2011 Funding Type	**Dollars Planned**
11. USDI BLM Funds	
12. USDI (other) Funds	
13. Other public funding	
14. Private funding	

Fiscal Year 2012 Funding Type	Dollars Planned
1. FY 2011 funding for implementation:	3,466,500
2. FY 2011 funding for monitoring	53,000
3. USFS appropriated funds:	2,150,000
4. USFS permanent & trust funds:	310,000
5. Partnership Funds	145,000
6. Partnership In-Kind Services Value (NRCS-Tulelake)	600,000
7. Estimated Forest Product Value	59,500
8. Other (specify) Legacy Funds	255,000
9. FY 2011 Total (total of 1-6 above for matching CFLRP request)	3,519,500
10. FY 2011 CFLRP request (must be equal to or less than above total)	1,764,000
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2012 Funding Type	**Dollars Planned**
11. USDI BLM Funds	
12. USDI (other) Funds	
13. Other public funding	
14. Private funding	

Fiscal Year 2013 Funding Type	Dollars Planned
1. FY 2011 funding for implementation:	3,014,700
2. FY 2011 funding for monitoring	53,000
3. USFS appropriated funds:	2,150,000
4. USFS permanent & trust funds:	310,000
5. Partnership Funds	155,000
6. Partnership In-Kind Services Value (NRCS-Tulelake)	400,000
7. Estimated Forest Product Value	52,700
8. Other (specify) Legacy Funds	0
9. FY 2011 Total (total of 1-6 above for matching CFLRP request)	3,067,700
10. FY 2011 CFLRP request (must be equal to or less than above total)	1,649,165
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2013 Funding Type	**Dollars Planned**
11. USDI BLM Funds	
12. USDI (other) Funds	
13. Other public funding	
14. Private funding	

Fiscal Year 2014 Funding Type	Dollars Planned
1. FY 2011 funding for implementation:	2,824,000
2. FY 2011 funding for monitoring	53,000
3. USFS appropriated funds:	2,150,000
4. USFS permanent & trust funds:	310,000
5. Partnership Funds	165,000
6. Partnership In-Kind Services Value (NRCS-Tulelake)	200,000
7. Estimated Forest Product Value	52,000
8. Other (specify) Legacy Funds	0
9. FY 2011 Total (total of 1-6 above for matching CFLRP request)	2,877,000
10. FY 2011 CFLRP request (must be equal to or less than above total)	1,653,215
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2014 Funding Type	**Dollars Planned**
11. USDI BLM Funds	
12. USDI (other) Funds	
13. Other public funding	
14. Private funding	

Fiscal Year 2015 Funding Type	Dollars Planned
1. FY 2011 funding for implementation:	2,628,500
2. FY 2011 funding for monitoring	53,000
3. USFS appropriated funds:	2,150,000
4. USFS permanent & trust funds:	310,000
5. Partnership Funds	175,000
6. Partnership In-Kind Services Value	0
7. Estimated Forest Product Value	46,500
8. Other (specify) Legacy Funds	0
9. FY 2011 Total (total of 1-6 above for matching CFLRP request)	2,681,500
10. FY 2011 CFLRP request (must be equal to or less than above total)	1,659,315
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2015 Funding Type	**Dollars Planned**
11. USDI BLM Funds	
12. USDI (other) Funds	
13. Other public funding	
14. Private funding	

Fiscal Year 2016 Funding Type	Dollars Planned
1. FY 2011 funding for implementation:	2,543,000
2. FY 2011 funding for monitoring.	53,000
3. USFS appropriated funds:	2,150,000
4. USFS permanent & trust funds:	210,000
5. Partnership Funds	185,000
6. Partnership In-Kind Services Value	0
7. Estimated Forest Product Value	51,000
8. Other (specify) Legacy Funds	0
9. FY 2011 Total (total of 1-6 above for matching CFLRP request)	2,596,000
10. FY 2011 CFLRP request (must be equal to or less than above total)	1,665,415
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2016 Funding Type	**Dollars Planned**
11. USDI BLM Funds	
12. USDI (other) Funds	
13. Other public funding	
14. Private funding	

Fiscal Year 2017 Funding Type	Dollars Planned
1. FY 2011 funding for implementation:	2,526,200
2. FY 2011 funding for monitoring	53,000
3. USFS appropriated funds:	2,150,000
4. USFS permanent & trust funds:	210,000
5. Partnership Funds	195,000
6. Partnership In-Kind Services Value	0
7. Estimated Forest Product Value	24,200
8. Other (specify) Legacy Funds	0
9. FY 2011 Total (total of 1-6 above for matching CFLRP request)	2,579,200
10. FY 2011 CFLRP request (must be equal to or less than above total)	1,670,515
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2017 Funding Type	**Dollars Planned**
11. USDI BLM Funds	
12. USDI (other) Funds	
13. Other public funding	
14. Private funding	

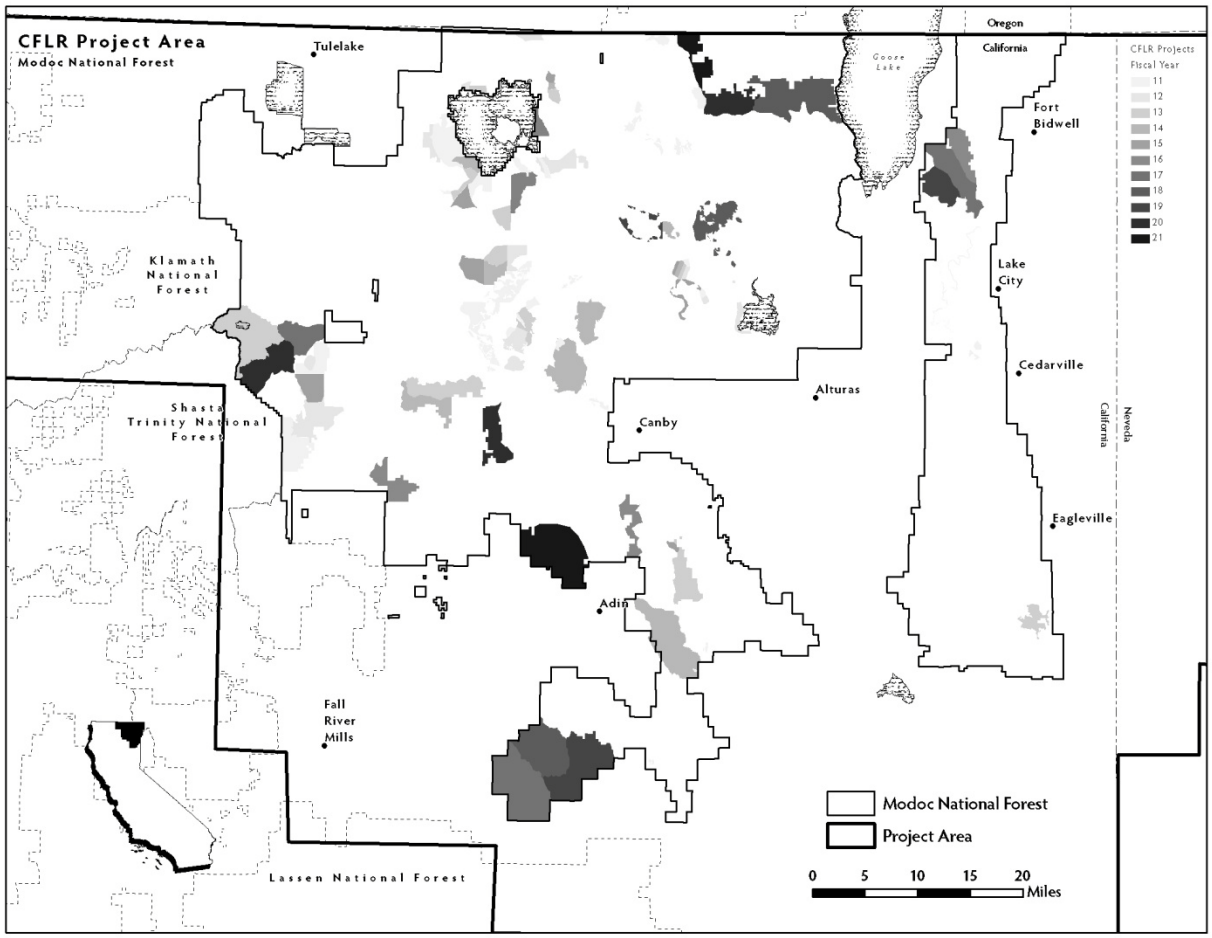
Fiscal Year 2018 Funding Type	Dollars Planned
1. FY 2011 funding for implementation:	2,545,000
2. FY 2011 funding for monitoring	53,000
3. USFS appropriated funds:	2,150,000
4. USFS permanent & trust funds:	210,000
5. Partnership Funds	205,000
6. Partnership In-Kind Services Value	0
7. Estimated Forest Product Value	33,000
8. Other (specify) Legacy Funds	0
9. FY 2011 Total (total of 1-6 above for matching CFLRP request)	2,598,000
10. FY 2011 CFLRP request (must be equal to or less than above total)	1,675,615
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2018 Funding Type	**Dollars Planned**
11. USDI BLM Funds	
12. USDI (other) Funds	
13. Other public funding	
14. Private funding	

Fiscal Year 2019 Funding Type	Dollars Planned
1. FY 2011 funding for implementation:	2,562,500
2. FY 2011 funding for monitoring	53,000
3. USFS appropriated funds:	2,150,000
4. USFS permanent & trust funds:	210,000
5. Partnership Funds	215,000
6. Partnership In-Kind Services Value	0
7. Estimated Forest Product Value	40,500
8. Other (specify) Legacy Funds	0
9. FY 2011 Total (total of 1-6 above for matching CFLRP request)	2,615,500
10. FY 2011 CFLRP request (must be equal to or less than above total)	1,680,715
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2019 Funding Type	**Dollars Planned**
11. USDI BLM Funds	
12. USDI (other) Funds	
13. Other public funding	
14. Private funding	

Fiscal Year 2020 Funding Type	Dollars Planned
1. FY 2011 funding for implementation:	2,565,000
2. FY 2011 funding for monitoring	53,000
3. USFS appropriated funds:	2,150,000
4. USFS permanent & trust funds:	210,000
5. Partnership Funds	225,000
6. Partnership In-Kind Services Value	0
7. Estimated Forest Product Value	33,000
8. Other (specify) Legacy Funds	0
9. FY 2011 Total (total of 1-6 above for matching CFLRP request)	2,618,000
10. FY 2011 CFLRP request (must be equal to or less than above total)	1,685,115
Funding off NFS lands associated with proposal in FY 2011 (does not count toward funding match from the Collaborative Forested Landscape Restoration Fund)	
Fiscal Year 2020 Funding Type	**Dollars Planned**
11. USDI BLM Funds	
12. USDI (other) Funds	
13. Other public funding	
14. Private funding	

Assumptions for Attachment F – Base rates are used, which do not reflect what the industry gets from the product or how that would provide important revenue for them. In-kind money and work consists of funds livestock permittees are spending on USFS allotments and NFS system lands under the Sage-Grouse Initiative.

Attachment G – Map of Project Area



Biomass Feasibility Assessment for Modoc County, California

Prepared for:

County of Modoc, CA
City of Alturas, CA
U.S. Department of Interior – Bureau of Land Management (Alturas Field Office)
U.S. Department of Agriculture – Modoc National Forest
U.S. Department of Agriculture – Natural Resources Conservation Service

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May 25, 2011

Acknowledgements

The author wishes to thank the following people and organizations for their contribution to this report:

- Jim Jungwirth – Watershed Research and Training Center
- Nick Goulette – Watershed Research and Training Center
- Peter Haul – Bureau of Land Management (BLM), Alturas Field Office
- Anthony Hewitt – Modoc National Forest
- Bill Moore – Modoc National Forest
- Matt Dreschel – Natural Resource Conservation Service (NRCS)
- Nathan Price – Natural Resource Conservation Service (NRCS)
- Tim Thayer – Midnight Harvesting
- Sean Curtis – County of Modoc
- Chester Robertson – City of Alturas

Executive Summary

This report was conducted to determine the feasibility of installing a biomass cogeneration facility in Modoc County. This was facilitated by the Sage Steppe Ecosystem Restoration Strategy (Sage Steppe), an Environmental Impact Statement (EIS) prepared by the Forest Service (FS) and the Bureau of Land Management (BLM). The Sage Steppe is a management plan that will remove roughly 4,000 acres of juniper annually.

Over the past several decades, fire suppression and grazing activities have drastically altered the natural ecosystem of the Sage Steppe. Currently, there are higher densities of juniper than ever before seen on the Modoc Plateau. The Sage Steppe EIS plans to remove encroaching juniper will attempt to restore the ecosystem back to its natural structure and functions. This offers a unique opportunity for the potential use of juniper biomass for energy generation.

This report contains analyses of the amount of juniper and other forest residues that will be removed on both public and private lands on the Modoc. Further, an analysis of potential sites that could accommodate a biomass facility was conducted. Each potential site was analyzed to determine the amount of juniper biomass that surrounds the site within a 50 – mile haul radius. Several sites were examined: 1) the old mill in Alturas, 2) the gravel site in Alturas, 3) the backscatter site (an old military compound) in northwest Modoc County, 4) the Canby mill site 20 miles west of Alturas, and 5) Cedarville in eastern Modoc County. A preliminary analysis revealed that the old mill site in Alturas would be the most strategic location for the installation of a biomass facility, mainly due to its proximity to major roadways, proximity to juniper feedstock within the Sage Steppe, and distance to competing biomass facilities in northern California and southern Oregon.

As a result from this analysis, it was revealed that there will be approximately 200,000 bone dry tons of biomass removed annually from the Modoc. This includes juniper that is slated for removal on both public and private lands, and additional forest residues in the form of slash from timber harvests on the Modoc National Forest.

The properties of juniper wood were also examined to determine suitability for biomass utilization. It was found that juniper is an excellent source of biomass to feed a biomass energy facility, mainly due to its wide branching patterns, high degree of taper, high density, high energy content, and low moisture content. Other commercial uses of juniper are very limited and are not in high demand. The use of juniper to generate energy seems to be superior to other uses, such as fence posts, flooring, particle board and novelty items.

The costs associated with removing juniper biomass from the forest were also examined. Preliminary investigations revealed that the main cost constraint for removal was the haul distance to the nearest biomass energy facility. Other cost constraints were wear and tear on equipment, mainly due to the geology on the ground (i.e. rocky outcroppings). However, some of the major costs for juniper biomass removal lie in the pre-treatment analysis processes. On public lands an Environmental Assessment is needed for site specific projects. A major cost associated with this is the archeological surveys, which cost approximately $30 per acre to conduct. This figure adds up quickly when a 2,000 acre unit is being examined for juniper removal. Finally, collection and processing cost associated with juniper biomass extraction were also examined. However, it was determined that were too many variables associated with local contractors and contract bids with the National Forest and BLM to fully analyze these costs. According to a forester with the BLM, chipping and removal bids from local contractors can

range from $150 to $500 per acre. However, there are many variables that can dictate the removal costs. Haul distances, slope, topography, geology, and local contractors economical needs are major factors that influence removal costs.

Finally, the economic impacts of an operating biomass facility in Modoc County were examined. It was determined that a 5-MW biomass facility would employ approximately 48 positions, with an annual salary from $20,000 to $60,000. The installation of a biomass facility in Modoc County would greatly improve the current economic stability of the area, while simultaneously improving the regions dependency on renewable resources for energy.

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1. Introduction

1.1 Purpose

The purpose of this project is to assess biomass availability and bio-energy potential in Modoc County, CA. This project is facilitated by the Sage Steppe Restoration Project (Sage Steppe Project) and the Dry Forest Restoration Project (Dry Forest) where multiple parties are involved, including the U.S. National Forest, the Bureau of Land Management (BLM), the U.S. Fish and Wildlife Service, private landowners, and the County of Modoc. The Sage Steppe Project is designed to enhance sage grouse habitat by removing encroaching juniper and other conifers over 4 million acres across Modoc County. These activities are planned to be implemented over the next 47 years, which will provide a consistent supply of forest products over the time period. Federal managers and private landowners plan to restore thousands of acres in the Sage Steppe and Dry Forest over the next 5 decades. This will produce an excess of non-merchantable forest biomass that may facilitate an interest to potential investors in the development of a bio-energy facility in Alturas, CA. The development of such a facility will create local jobs, generate tax revenues for Modoc County, and reduce dependency of non-renewable resources for energy generation. This assessment includes information regarding optimal locations for the development of an energy facility near Alturas, CA taking into consideration proximity to feedstocks and supporting infrastructure.

1.2 Project Area

1.2.1 Location and Demographics

The Sage Steppe focus area encompasses over 4 million acres throughout Modoc, Lassen, Siskiyou, and Shasta Counties in California, and Washoe County, NV. However, for the interest of this assessment, the available feedstock is focused within Modoc County (Figure 1.1).

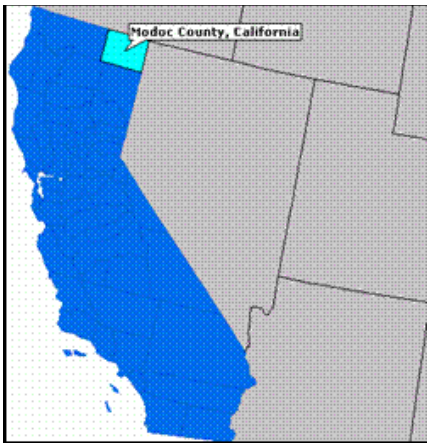

Figure 1.1. Location of Modoc County, in the northeast corner of California.

Modoc County is characterized as a very rural county in California. Most of the landownership is administered by the federal government or private ownership. The City of

Alturas serves as the county seat. The primary industries within the county are government positions and agriculture. Other industries include recreation, wholesale/retail, and manufacturing. However, Modoc County has the lowest median income rate of any other county in California. Further, 17% of the citizens are below the national poverty level (Table 1.1).

Table 1.1. Modoc County summary statistics

Land area (square mile)	4,203
Federal land ownership (acres)	1,876,580
State ownership (acres)	20,385
County ownership (acres)	1,159
City ownership (acres)	834
Private ownership (acres)	791,021
Railroads and Utilities (acres)	4,216
Population (2006)	9,910
Population density (persons per square mile)	2.513
Population in households (2000)	9,427
Population per household (2000)	2.39
Housing stock (2000)	4,836
Median household value (2000)	$69,100
Median household income (1998)	$35,319
Persons below poverty level (percent 2008)	17

1.2.2. Ecology and climate of Modoc County

The Modoc Plateau (ranging from 4,000 – 10,000 ft) exhibits a dry forest zone, consisting of scattered mosaics of big and low sagebrush, grasslands, pines and juniper. The historic ecology of Modoc County has changed in the past 100 years, mainly due to fire suppression, logging, and cattle grazing. In particular, fire suppression policies have altered the spatial complexities and species composition of forest lands and shrub lands. Scattered, sparse mosaics of juniper have encroached into natural sagebrush areas resulting in higher densities of juniper than have ever naturally occurred before (Figure 1.2). Past fire regimes exhibited frequent, low-intensity fires that burned juniper seedlings and promoted the growth of sagebrush lands, creating critical habitat for species such as the sage grouse. Today however, there is an increase in fuel loading which has altered the fire regimes to frequent mid- to high-intensity fires.

Water availability on the Modoc Plateau is critically important for healthy ecological processes. Annual precipitation is low, averaging 12", mostly in the form of snowfall in the winter months. Summers are very dry and hot, averaging daytime high temperatures into the 90's Farhenheight. This lack of water availability adds stress to the unusually high densities of juniper and other conifers in the region. One goal of the Sage Steppe is to reduce water competition to unusually dense stands of juniper and other conifers. Currently, Dry Forests on the Modoc Plateau are experiencing drought induced stress that is resulting in an increase in bark beetle activity. That, coupled with milder winters allow for multiple generations of bark beetles

per growing season. Bark beetle induced mortality has resulted in an increase of fuel loading on the Modoc, which increases the likelihood of severe wildfires.

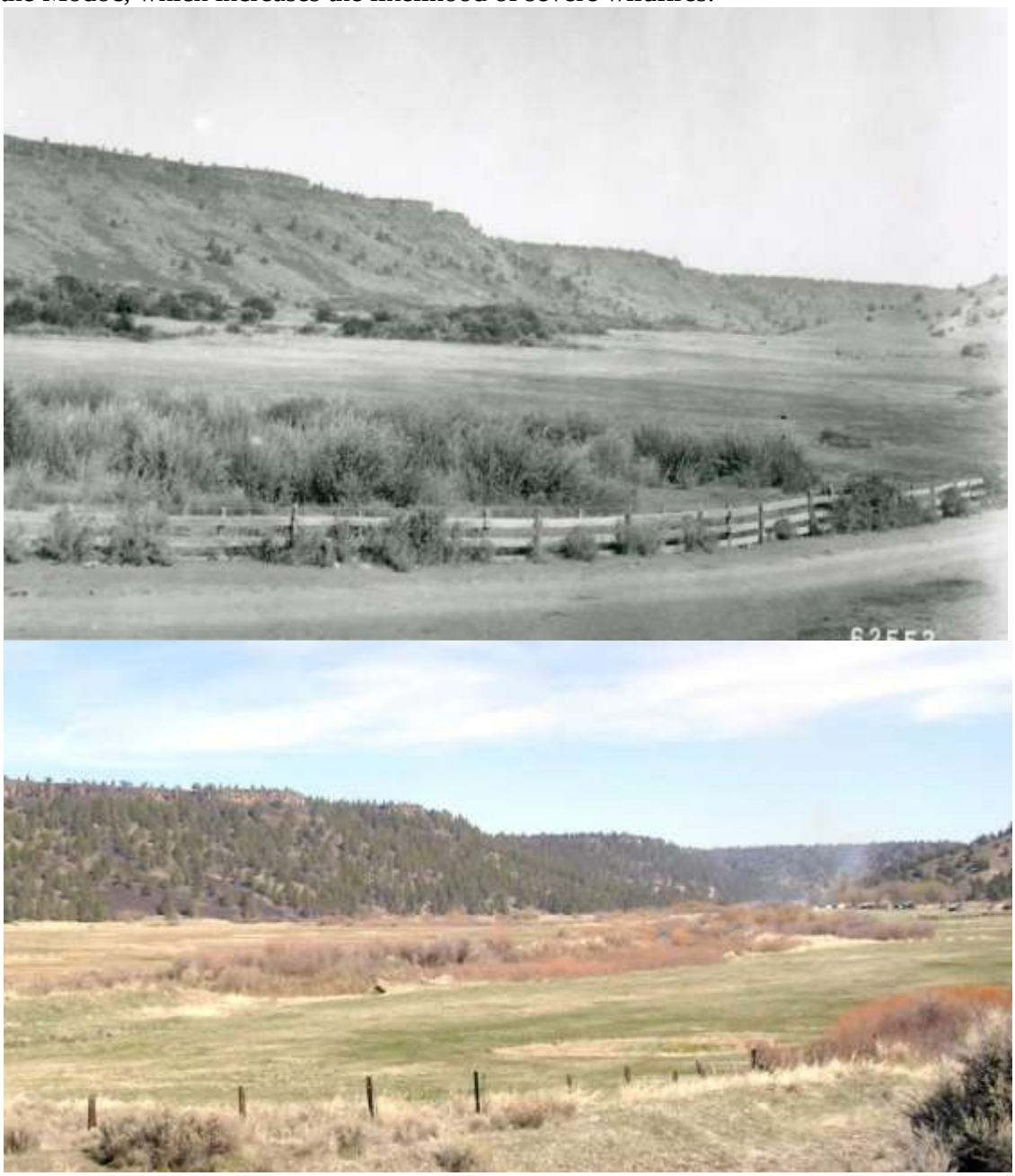

Figure 1.2. The image at the top is the North Fork of the Pit River in 1906. The image at the bottom was taken at the same location in 2007. Notice the significant increase of juniper and other conifers on the hillside in the 2007 image.

1.3 Project Need

The Sage Steppe and Dry Forest projects will produce high amounts of forest products annually over the next 5 decades. The installation of a biomass facility in Alturas, CA could utilize un-merchantable forest biomass while providing renewable energy for California. Some areas within the Sage Steppe are within reasonable haul distances to other biomass facilities, and to biomass facilities in development. However, there is a large area within the Sage Steppe that will produce annual feedstock, but is too far from existing facilities to be economically feasible. Further, timber harvest operations within the Dry Forest areas on the Modoc will produce forest residues that could be utilized for biomass energy.

There are several biomass facilities within the northeast portion of California and southeast portion of Oregon (Table 1.2). There has been consistent feedstock for the past 25 years to facilities in northern California. Further, the installation of new facilities within the region suggests that consistent feedstock will continue into the future.

Table 1.2. Biomass energy plants within northeast California and southeast Oregon.

Owner	Location	Capacity MegaWatt	Distance from Alturas, CA (miles)	Operational Date
Burney Mountain Power	Burney, CA	9.75	91	1985
Sierra Pacific Industries	Burney, CA	18	91	1986
Green Leaf Power	Honey Lake, CA	36	89	1989
Burney Forest Products	Burney, CA	31	91	1989
Big Valley	Bieber, CA	7.5	53	2005
Klamath Falls Bioenergy	Klamath Falls, OR	35	98	2012*
Iberdrola Renewables	Lakeview, OR	26.8	54	2012*

* Estimated operational date

Using the Coordinated Resource Offering Protocol (CROP) website (http://www.crop-usa.com/), haul distances were calculated for each biomass energy plant in Table 1.2. Other assessments have assumed average haul distances of 25 – 50 miles as an economic threshold for the value of biomass (Biomass Desk Guide, 2007; Preliminary Feasibility Assessment for the US Forest Service for a Proposed Biomass Facility in Yreka, California Klamath Site, 2010). As a preliminary assessment, we examined a 25 mile haul radius around existing biomass energy facilities. On the CROP website, the "Interactive Haul Radius Map" was used to generate Figure 1.3.

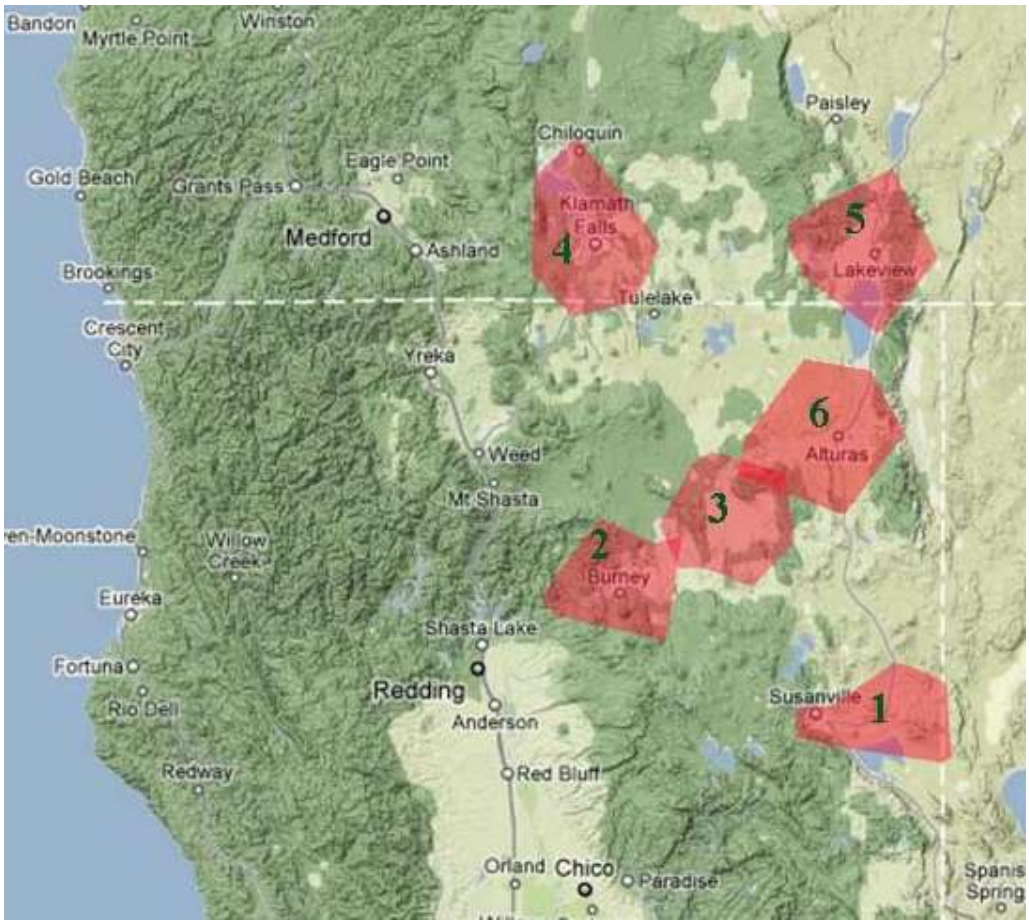

Figure 1.3. The areas shaded in red are 25 mile road route radii for biomass energy facilities in northeast California and southeast Oregon. The polygons are labeled to identify the location of each facility: [1] Wendel, CA [2] Burney, CA [3] Beiber, CA [4] Klamath Falls, OR [5] Lakeview, OR and [6] Alturas, CA.

As can be seen in Figure 1.3, the need for a biomass energy facility in Alturas is apparent. There is a considerable amount of area surrounding Alturas that is within the Sage Steppe and Dry Forest projects and other timber harvest areas, and that are within a 25 mile haul radius. Competing biomass facilities in the region have haul distances that are too far to utilize non-merchantable biomass within this area. Further, as can be seen in Table 1.1, Modoc County has a very narrow array of businesses, and the lowest median income in the state. The installation of a biomass energy facility would improve local economies.

1.4 Project Team

The Watershed Research and Training (WTRC) center employees have organized this assessment. Jim Jungwirth was the project manager and William Coltrin was the principle investigator. This project includes, but not limited to, parties such as: the Modoc National Forest

staff, Bureau of Land Management (BLM, Alturas Field Office) staff, Natural Resources Conservation Service (NRCS) staff, and the County of Modoc staff.

1.5 Project Goals

The goals of this biomass assessment for Modoc County include:

1. Promoting the use of sustainable and renewable biomass energy
2. Reviewing previous biomass assessment studies
3. Identifying potential biomass energy facility sites near Alturas, CA
4. Determining forest biomass generation and availability within reasonable haul distances to Alturas
5. Identifying biomass fuel characteristics of juniper and other mixed conifers
6. Determining costs to remove forest biomass and deliver to biomass facility
7. Examining the economic impacts of operating a biomass energy facility in Modoc County

2. Review Previous Studies and Reports

2.1 Biomass Energy and Bio-fuels from Oregon forests

A study provided for the Oregon Forest Resource Institute looked into potential biomass energy plants that would be fueled from forests residues in Oregon's forests. The key finding in this report was that forest restoration should be the driving factor when assessing the potential for a biomass energy facility. They found that collaboration with multi-stakeholder groups in determining proper forest restoration techniques built trust between parties, which facilitated the potential of a biomass energy facility to utilize forest restoration residues. Further, they found that when assessing biomass energy, the goals of forest restoration should be better stated. They suggest that forest monitoring followed by adaptive management will ensure that the goals of forest restoration are adequately met over time.

2.2 Placer County, CA Biomass Assessment

A preliminary study was completed to assess the potential of a small cogeneration biomass energy plant in the Lake Tahoe Basin of Placer County. They found that excess heat provided by a small biomass plant (1 – 3 MW) that is situated correctly in the Tahoe Basin, could be used to heat sidewalks for snow removal. This is an appealing proposal because it could further offset the greenhouse gas emissions associated with snow plowing. However, proximities to urban areas and feedstock make this finding rather an unlikely situation in other areas.

Size and type of biomass energy utilization were also important factors in this assessment. They looked at different biomass energy technologies and concluded that an Advanced Recycling Equipment (ARE) direct combustion system with a condensing steam turbine/generator was the highest ranked and shows the best economic and technical promise for the proposed application. Further, improved air quality showed promise with the use of this type of technology.

2.3 Dry Forest Mechanized Fuel Treatments

A study conducted in Oregon in the Dry Forest zone examined various harvesting methods for biomass thinnings (i.e. small diameter trees). The study was funded through the Forest Service and the National Fire Plan to determine proper fuels reduction treatments in Wildland Urban Interfaces (WUI). In this study, 15 different harvesting units were examined for their efficiency of fuel removals and associated costs. Generally, the harvesting methods ranged from treating 0.5 to 1.5 acres per day, costing $500 to $1,000 per day. Each method removed hazardous fuels by raising the average canopy base and decreasing the basal area. Further, average height was increased from the treatments without compromising fuel bed depths.

The study examined mastication as a form of fuels treatment and revealed that the costs were lower than biomass removal. However, the economic impacts of biomass removal did not include biomass utilization. Further studies would be needed to determine the economical impacts of biomass utilization in conjunction with different harvesting methods.

Winter harvesting was also examined. Reduced soil impacts were significant when operating over frozen ground or snow. Further, extending the operating period reduced costs for contractors which in turn reduced total cost per acre.

Recommendations made from this study suggested that the media and the public be able to attend demonstrations. Further, inviting high profile public officials to demonstrations would help spread the knowledge and interest to the public at a regional and statewide level.

2.4. Big Valley Forest Production and Stewardship Project

A study was conducted to assess the biomass availability surrounding Bieber, CA, which is situated within Big Valley and near the Modoc Plateau. This study reviewed some major obstacles regarding the removal of excess fuels on private lands. Most notably, they found that there was a lack of chipping and hauling contractors in the area for hire. This was mainly due to the downsizing of businesses and the trend of contractors to focus on fuel removals on public lands. Further, the rising cost of diesel tended to limit the haul distances of biomass from private lands. However, the main constraint they found for private landowners to treat the fuels on their land was the uncertainty of future biomass values. Private landowners were very aware of the negotiations between biomass energy facilities and electric companies regarding the price paid per kilowatt hour. This study found that a stable biomass market would increase private landowner participation of fuel removals.

3. Facility Siting Analysis

3.1 Site identification and preliminary screening

Potential sites for a biomass energy facility were explored for the Modoc. Proximity to transmission lines or substations was the primary component that was examined. Other components taken into consideration were proximity to major roadways, available biomass within a 50 mile radius, and other infrastructure that could potentially use the waste heat from a biomass co-generation facility.

3.1.1 The Alturas Old Mill Site

The old mill in Alturas is currently non-operational and industrial parcels surrounding it are for sale (Figure 3.1). This is the highest ranked site due to the existing infrastructure that could utilize waste heat for another product. Further, this site is only a couple miles from the Bonneville Power Administration (BPA) substation. BPA serves electricity to over 300,000 square miles in California, Oregon, Washington, Idaho, Montana, Utah, Nevada and Wyoming. Direct access to transmission lines are very close to this site. Further, the site is situated near the junction of Highway 299 and U.S. Highway 395, two major throughways that would allow easy transportation of biomass from the field to the facility.

Figure 3.1. Location of the Old Mill site near Alturas, CA.

3.1.2 Gravel site

The Gravel site sits less than a mile from U.S. Highway 395 in Alturas (Figure 3.2). It is less than two miles from the Bonneville Power Administration substation and the Surprise Valley Electrification Corporation.

Figure 3.2. The Gravel site is conveniently located near Alturas and U.S. Highway 395.

3.1.3 Canby Mill Site

Canby is located approximately 19 miles west of Alturas (Figure 3.3). There is also an old mill there, which makes this location a potentially good site for a biomass facility. Further, its proximity to Highway 299 and Highway 139 allow easy access to transport biomass from the field to a biomass facility. This site sits near three substations which allows for easy access to transmission lines. The property is 53 acres in size and is zoned industrial.

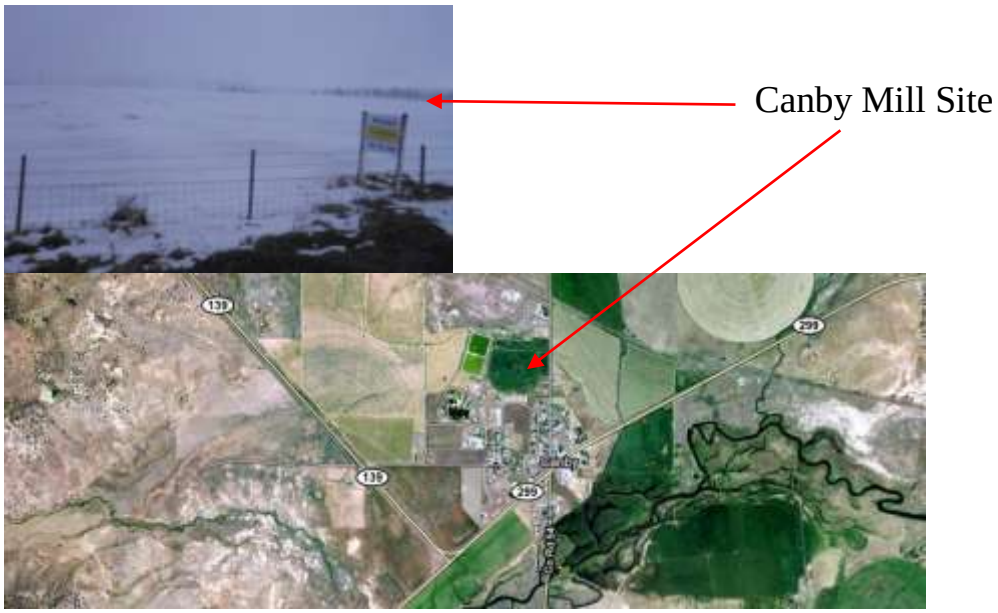

Figure 3.3. The Canby mill site is potentially a good site due to its proximity to two major throughways.

3.1.4 The Backscatter Site

The Backscatter site is located on property owned by the U.S. Military (Figure 3.4). It is an old radar facility that is no longer in operation. There are three 300 acre parcels available. This site has decent potential for a biomass facility due to its proximity to Highway 139, and its distance from residential areas makes it more attractive. This site may not be met with public opposition, where the other sites may, due to their proximity to residential areas.

Figure 3.4. The Backscatter site is located in a remote area on the Modoc.

3.1.5 Cedarville, CA

Just east of Alturas, over the Warner Mountains lies the town of Cedarville. This small town currently has a mill that is operating part time. The benefits of biomass cogeneration are increased when there is a mill on site. Excess heat created from the combustion process of biomass is usually used in conjunction with the heating needs of a mill. Further, the sawdust produced from the milling process is burned in the cogeneration system as well. The Sierra Pacific cogeneration facilities in Burney, CA use this as their model for biomass utilization, as well as many others.

Because of the mill in Cedarville, a biomass facility installed there is an attractive proposal. However, the location of this site relative to the Sage Steppe is not ideal (Figure 3.5). One-half of the 50 mile haul radii extend into portions of Nevada, that are far from the Sage Steppe, and do not have the appropriate feedstocks to support a biomass utilization facility. Due to this, we did not fully analyze the amount of biomass available within a 50 mile haul radius. However, we felt that it was important to describe each potential site.

Figure 3.5. The blue line represents a 50 mile haul radius around Cedarville, CA. The driving distance from Cedarville to Alturas is approximately 40 miles. Note that the eastern half of the haul radius extends into Nevada where very little feedstock exists.

4. Forest Biomass Generation and Availability

4.1 Past five year forest products and biomass removals

There has been considerable amount of harvest activity on the Modoc over the past five years. Management regimes from public lands include timber harvests, pre-commercial thins, biomass removals for fuels reduction treatments, and biomass removals from restoration projects. Further, there has been considerable funding through the Natural Resource Conservation Service (NRCS) to private landowners for juniper removal.

The Coordinated Resource Offering Protocol (CROP) analyzed the amount of removals across public lands on the Modoc from 2006 – 2010 (Table 4.1). The purpose of this section is to show that there has been a steady stream of forest management activities on the Modoc. Through the Sage Steppe project, Dry Forest project, and increased funding for private landowners through NRCS, the stream of forest products and biomass removals will likely continue.

Table 4.1. Past five year removals from public agencies on the Modoc.

Federal Land Agency and Location	Biomass (green tons)	Small logs (mmbf)	Large logs (mmbf)
Klamath N.F. Goosnest Ranger District	53,750	36	16.8
Modoc N.F. Warner Mnt. Ranger District	134,000	7.2	15.7
Modoc N.F. Devils Garden Ranger District	96,700	5.3	11.2
Modoc N.F. Big Valley Ranger District	183,000	6.4	13.6
Modoc N.F. Doublehead Ranger District	23,000	2.9	5.5
BLM Alturas Field Station	2,740	2.6	2
BLM Suprise Field Station	265	0.3	0.15
Total	493,455	61	65
Annual	98,691	12.14	12.99
Annual Biomass (bdt)	49,346		

4.2 Current Forest Biomass Availability

4.2.1 Methods for calculating juniper biomass on the Modoc

The Sage Steppe project classified juniper stands to be mechanically treated with varying densities from satellite imagery. They identified juniper stands as "dense" if the canopy cover was greater than 20% and it was less than one mile from a road. If the canopy cover was from 6 – 20% and it was less than one mile from a road, then they classified it as "less dense". They classified "isolated juniper" stands as having greater than 20% canopy cover, but are further than one mile away from an existing road. Each classification excludes areas that have slopes greater than 30%.

BLM have already been conducting juniper biomass removals for restoration purposes. From their experience, they estimated an average of 8 – 10 bdt/acre of biomass. However, this is an average across one to two thousand acre projects. According to a forester with the BLM, a juniper stand with 20% canopy cover produces about 8 bdt/acre. However, on the Modoc there are numerous stands that have greater than 20% canopy cover. Some stands are so dense that the amount of biomass removed can be up to 35 bdt/acre (Figure 4.2.1)

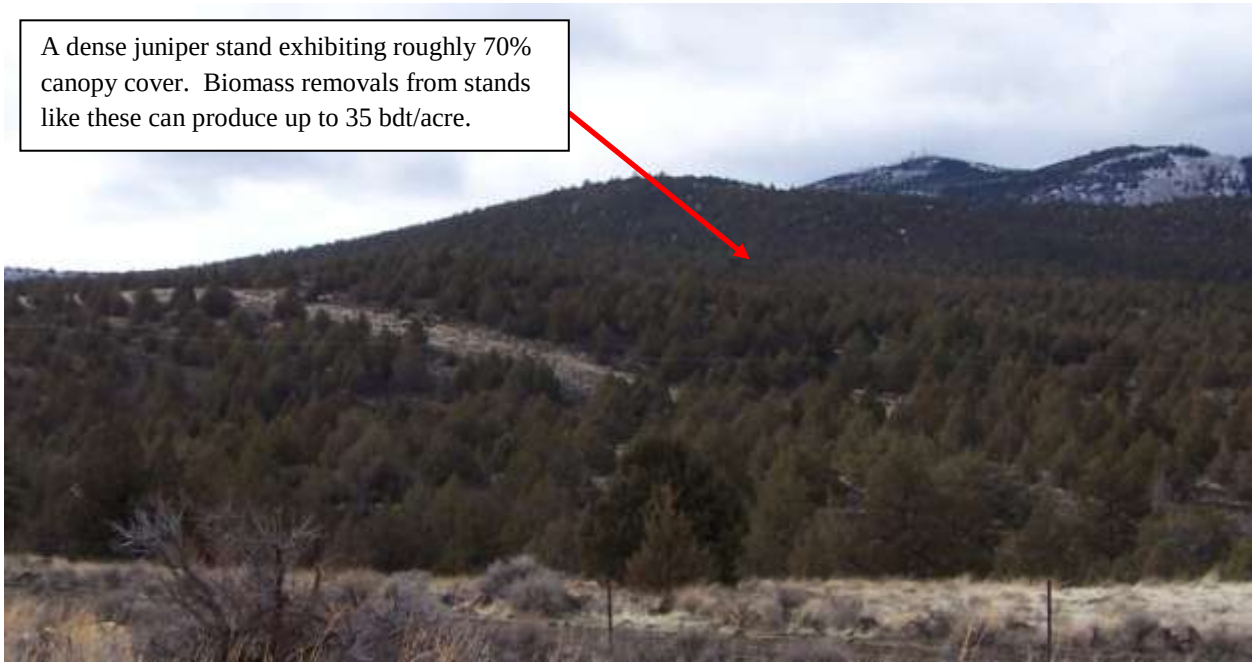

Figure 4.2.1. Dense juniper stand on the Modoc prior to BLM treatment.

Due to lack of inventory data available, some additional data was required to obtain an accurate estimate of total juniper biomass across the landscape. Plots were taken using traditional forest mensuration techniques in various juniper stands. Also, data from Tausch (2008) and Sabin (2008) were used. The data collected in the field was used in the Forest Vegetation Simulator (FVS) with the Fire and Fuels Extension (FFE) to calculate bone dry tons of juniper biomass per acre and percent juniper canopy cover. The data from the Tausch (2008) and Sabin (2008) provided the same data for various densities of juniper stands. A linear regression model was fit to the data to produce an equation that predicts bone dry tons per acre of

juniper biomass by using canopy cover as the independent variable (Figure 4.2.2). The equation suggests that canopy cover is an excellent variable to predict biomass in juniper stands.

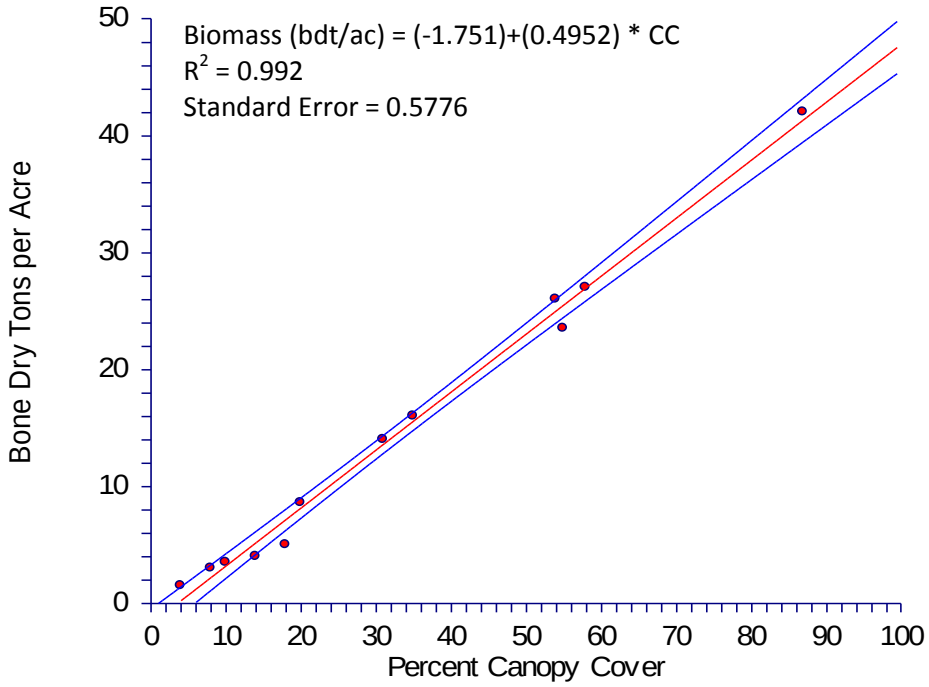

Figure 4.2.2. A linear regression equation to predict juniper biomass per acre using percent canopy cover as the predictor variable. The red dots are data points, the red line is the predicted values and the blue lines are 95% confidence intervals around the mean.

A GIS specialist with the Forest Service was able to gather data across all agencies to produce maps of juniper distribution across the Modoc. The data of juniper distribution was extrapolated from satellite imagery, and were not validated on the ground. However, this is the best data currently available. According to Forest Service officials, new, more accurate imagery will be available soon. From the current imagery, densities of juniper stands were delineated to show the distribution of juniper with canopy cover from 1 – 19.9%, 20 – 49.9%, 50 – 69.9%, and 70 – 100%. Total acreage was also calculated for juniper stands in each canopy cover class. This made it possible to obtain a better estimate of total biomass available, with a low, mid, and high estimate. However, this estimate does not include juniper on private lands or out of state lands. According to the NRCS, there are nearly 600,000 acres of private lands on the Modoc that are overstocked with juniper. The biomass estimates generated from public lands will be applied to private lands as well. This will help determine total juniper biomass across the landscape and across all types of ownership.

4.2.2 Results of juniper biomass on the Modoc

Each potential site was analyzed to determine the amount of juniper biomass available within a 50 mile haul radius. The old mill site and the gravel site (Figure 4.2.3), and the Canby site (Figure 4.2.4) engulfs the majority of the juniper in the Sage Steppe (since the proximity of the old mill site and the gravel site are close, they were analyzed together). The backscatter site (Figure 4.2.5) engulfs the majority of the Sage Steppe, however the southern portion portions are too far to accommodate reasonable haul distances. The other issue with this site is that a biomass facility is currently under construction in Klamath Falls, which leads to overlapping haul radii between facilities. However, since this site is located in such a remote area, it will likely not be met with much public opposition. The Alturas site is located near the junction of Highway 299 and U.S. Highway 395, which is in the heart of Alturas, and may lead to increased public opposition, because of this, the Canby site may be more desirable.

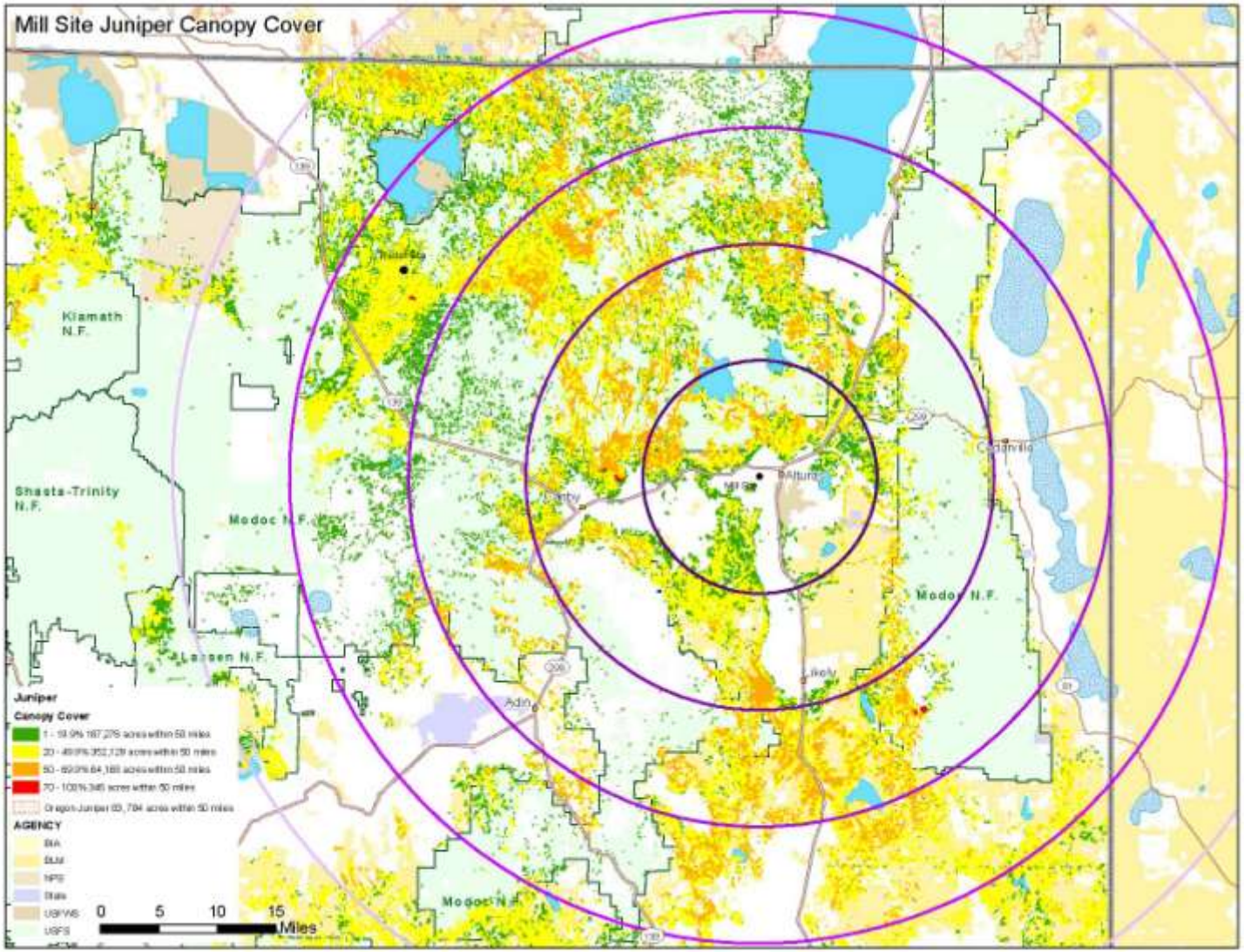

Figure 4.2.3. Juniper distribution around the old mill site in Alturas. Each circle represents a 10 mile radius increment totaling a 50 mile haul radius. At this site there is an abundance of juniper biomass available within reasonable haul distances.

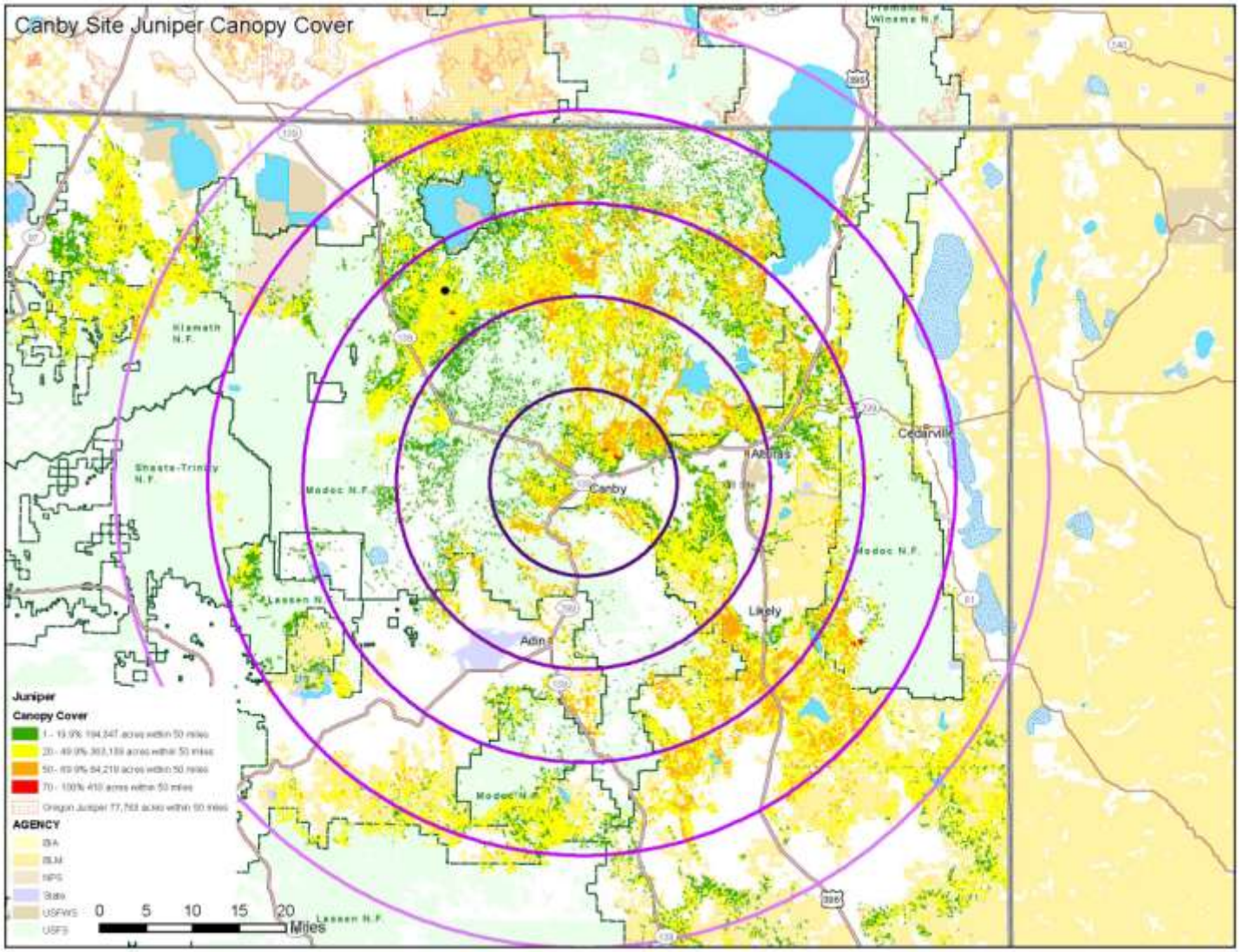

Figure 4.2.4. Juniper distribution around the Canby site in Modoc County. Each circle represents a 10 mile radius increment totaling a 50 mile haul radius. At this site, the junipers that will be available in the southern portions of the Sage Steppe are located at reasonable haul distances.

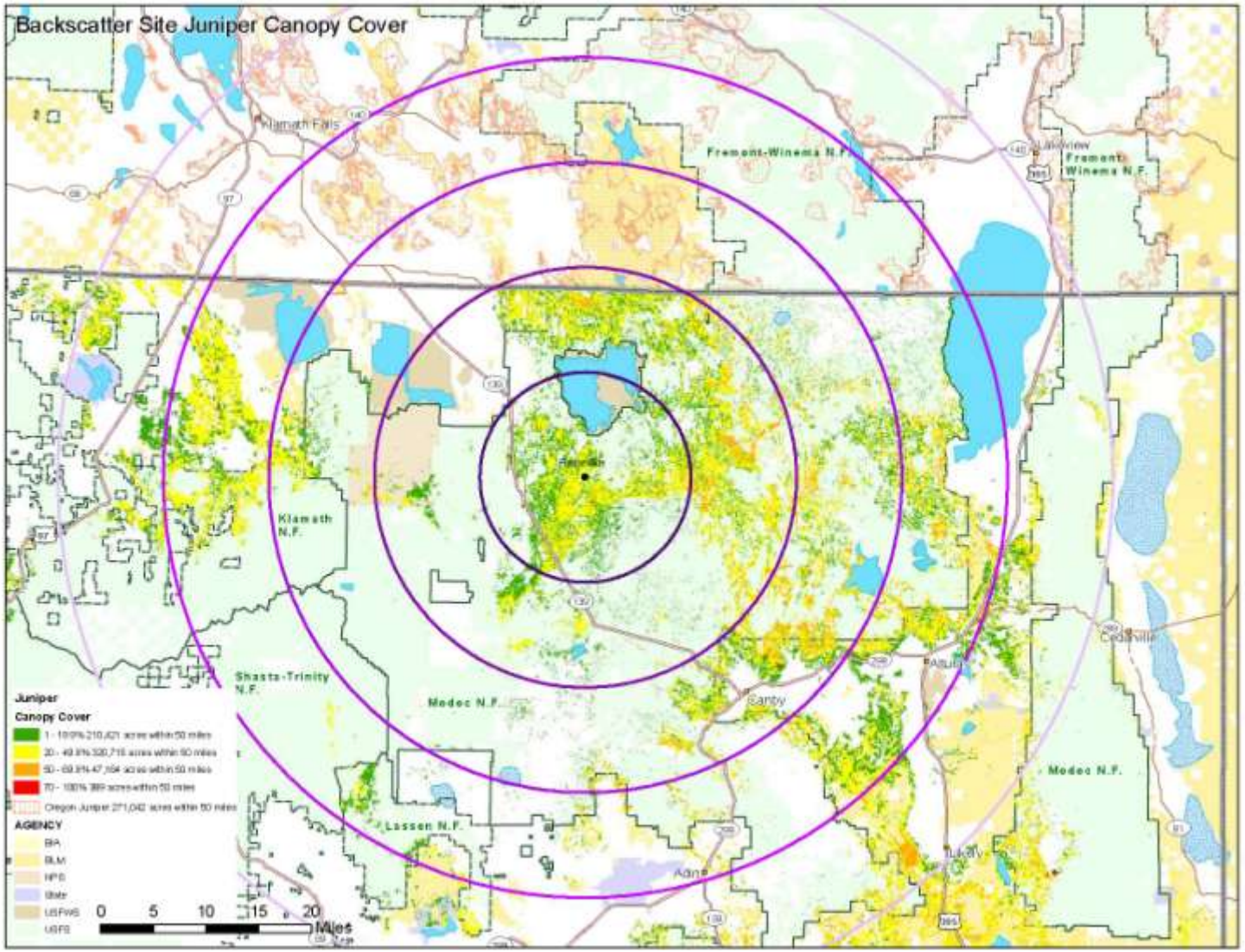

Figure 4.2.5. Juniper distribution around the backscatter site in Modoc County. Each circle represents a 10 mile radius increment totaling a 50 mile haul radius. At this site, the junipers that will be available in the southern portions of the Sage Steppe are located at unreasonable haul distances.

The total juniper biomass available within the 50 mile radius of each site can be seen in Table 4.2. These estimates however do not include juniper on private lands or out of state lands. The average number of bone dry tons per acre was calculated from this data. Further, it was validated between each site (Table 4.3).

Table 4.2. Juniper biomass estimates for the old mill, gravel, backscatter and Canby sites.

Old Mill and Gravel Site

		Biomass Estimates (bdt)		
Canopy Cover	Acreage	Low	Mid	High
1-20%	187,276	18,728	599,283	1,535,663
20-50%	352,129	2,887,458	4,612,890	8,098,967
50-70%	64,168	1,475,864	1,796,704	2,111,127
70-100%	346	11,072	13,113	16,539
Total	603,919	4,393,121	7,021,990	11,762,296

Backscatter Site

		Biomass Estimates (bdt)		
Canopy Cover	Acreage	Low	Mid	High
1-20%	210,421	48,354	673,557	1,715,562
20-50%	320,715	2,614,789	5,791,150	7,379,331
50-70%	47,164	1,085,196	1,318,752	1,552,308
70-100%	389	12,803	14,729	18,582
Total	578,689	3,761,144	7,798,190	10,665,784

Canby Site

		Biomass Estimates (bdt)		
Canopy Cover	Acreage	Low	Mid	High
1-20%	194,347	44,660	622,105	1,584,511
20-50%	363,139	2,960,672	4,758,937	8,355,465
50-70%	64,219	1,477,615	1,795,627	2,113,640
70-100%	410	13,494	15,524	19,585
Total	622,115	4,496,443	7,192,193	12,073,202

Table 4.3. Biomass per acre at each potential site.

	Bone dry tons per acre			
Site	Low	Mid	High	Average
Old Mill and Gravel	7.3	11.6	19.5	12.8
Backscatter	6.5	13.5	18.4	12.8
Canby	7.5	11.6	19.4	12.8

These estimates of total biomass within the 50 mile haul radii are likely accurate, however they do not take into account distances from existing roads. Further, they do not take into account removal restraints such as rock outcroppings and slopes over 30%. The true available juniper biomass will be less than what is estimated for the total acreage. However, this analysis has revealed that across the entire landscape, the average amount of biomass is 12.8 tons per acre. This figure is very helpful to determine how much biomass will be removed from the Sage Steppe in a given year. For example, in the Sage Steppe EIS, the preferred alternative J states that 515,300 acres of juniper will be mechanically treated over the next 50 years. So, if there are 12.8 tons per acre on average, then there are 6,595,840 bone dry tons of juniper biomass that are planned to be removed in the Sage Steppe.

The NRCS has determined that there are 600,000 acres of private lands that are encroached with juniper in Modoc County. In addition, with the installation of a biomass facility in Alturas, NRCS officials claim that as many as 1 million acres of private land might be available for juniper removal. Using 12.8 bdt/acre across the Modoc, there will likely be an additional 7.6 – 12.8 million bdt on private lands as well. Personal communications with local ranchers has revealed that private landowners are very eager to restore their lands to historical ecological patterns. The installation of a biomass facility in Alturas will likely facilitate increased juniper biomass removal on private lands, as long as the delivered biomass will pay for removal costs. The NRCS claims that they will try to mechanically remove 10,000 acres of juniper on private lands annually.

4.2.3 Estimated annual juniper biomass removal

Assuming that there are 12.8 bdt/acre of juniper averaged across the landscape, an estimate of available biomass on an annual basis was determined (Table 4.4). Appendix A contains the biomass availability over the next four decades. These estimates will help determine the capacity of a biomass facility in Modoc County.

Table 4.4. Juniper biomass availability over the next two decades.

	Acres of juniper to be mechanically removed		
Year	Public Lands	Private Lands	Total Biomass (bdt)
2011	3,080	10,000	167,424
2012	3,080	10,000	167,424
2013	3,080	10,000	167,424
2014	3,080	10,000	167,424
2015	3,080	10,000	167,424
2016	3,080	10,000	167,424
2017	3,080	10,000	167,424
2018	3,080	10,000	167,424
2019	3,080	10,000	167,424
2020	3,080	10,000	167,424
2021	4,620	10,000	187,136
2022	4,620	10,000	187,136
2023	4,620	10,000	187,136
2024	4,620	10,000	187,136
2025	4,620	10,000	187,136
2026	4,620	10,000	187,136
2027	4,620	10,000	187,136
2028	4,620	10,000	187,136
2029	4,620	10,000	187,136
2030	4,620	10,000	187,136

The acres of juniper to be mechanically removed on public lands came from the preferred alternative J of the Sage Steppe EIS. However, according to public officials from the Forest Service and BLM, these estimates may not be accurate. Funding for juniper removal planning is the main constraint for determining how many acres will be treated annually.

It should be noted however that the estimate on private lands in Table 4.4 is a conservative estimate. According to NRCS officials, the number of acres of treated juniper on private land would likely increase significantly if juniper biomass became more valuable. Given that a biomass facility was available to pay for juniper biomass, the annual removal of juniper on private lands might reach as high as 30,000 acres per year.

4.2.4 Additional Available Forest Residues

Aside from juniper biomass removal, other harvesting activities will likely occur on the Modoc as well. According to the Modoc NF Vegetation Management Officer, an annual average of 4,500 acres of timberlands is treated for pre-commercial thinnings, fuel reduction treatments, timber harvests and restoration treatments. The forest residues from these treatments exist in the form of slash piles (tree tops and branches) and small diameter trees. Officials at the Modoc NF estimate that there is roughly 55,000 green tons of biomass available annually over the 4,500 acres treated for these management scenarios. The general rule of thumb for converting green tons of biomass to bone dry tons is to multiply the green tons by a conversion factor of 0.5. This means that on average, one ton of green biomass is equal to 0.5 tons of bone dry biomass. And, on the Modoc NF there are roughly 27,500 bdt, or 6.1 bdt/acre of additional forest residues available annually.

4.2.5 Total Annual Available Biomass on the Modoc with Reduction in Funding Scenarios

The total annual biomass that will likely be available on the Modoc was estimated from the sections above. This includes juniper removal as part of the Sage Steppe Project, juniper removal from private lands, and additional forest residues from National Forest harvesting activities. Further, a scenario that includes a 20% reduction in funding on both public lands and private lands were considered (Table 4.5). This will give the lowest possible estimate of available biomass on the Modoc (Table 4.6).

Table 4.5. 30 Year Available Biomass on the Modoc with 100% Funding and 80% Funding

	Bone Dry Tons on the Modoc					
	Juniper (Public Lands)		Juniper (Private Lands)		Additional Forest Residues	
Year	100%	80%	100%	80%	100%	80%
2011	39,424	31,539	128,000	102,400	27,500	22,000
2012	39,424	31,539	128,000	102,400	27,500	22,000
2013	39,424	31,539	128,000	102,400	27,500	22,000
2014	39,424	31,539	128,000	102,400	27,500	22,000
2015	39,424	31,539	128,000	102,400	27,500	22,000
2016	39,424	31,539	128,000	102,400	27,500	22,000
2017	39,424	31,539	128,000	102,400	27,500	22,000
2018	39,424	31,539	128,000	102,400	27,500	22,000
2019	39,424	31,539	128,000	102,400	27,500	22,000
2020	39,424	31,539	128,000	102,400	27,500	22,000
2021	59,136	47,309	128,000	102,400	27,500	22,000
2022	59,136	47,309	128,000	102,400	27,500	22,000
2023	59,136	47,309	128,000	102,400	27,500	22,000
2024	59,136	47,309	128,000	102,400	27,500	22,000
2025	59,136	47,309	128,000	102,400	27,500	22,000
2026	59,136	47,309	128,000	102,400	27,500	22,000
2027	59,136	47,309	128,000	102,400	27,500	22,000
2028	59,136	47,309	128,000	102,400	27,500	22,000
2029	59,136	47,309	128,000	102,400	27,500	22,000
2030	59,136	47,309	128,000	102,400	27,500	22,000
30 Year Annual Average juniper on Public Lands	49,280	39,424				

Table 4.6. Total Annual Available Biomass on the Modoc with 100% Funding and 80% Funding

Total Annual Biomass (bdt)	
100%	80%
204,780	163,824

5. Biomass Fuel Characterization

5.1 Growth forms of juniper and other conifers

Growth forms of trees species help determine the types of forest products that can be obtained from the tree. In the logging industry, the ideal growth form of conifers is a straight stem with little taper and few branches. From this, the maximum amount of boards can be extracted while minimizing the amount of forest residue (i.e. branches and tops) left behind. However, when a trees growth form has been manipulated due to natural phenomenon (i.e. broken tops, multi-stem tops, crooks, etc.) it becomes less useable to extract boards due to excess residues. In this situation, the log to residue ratio (less logs, more branches) becomes lower than with a straight single stemmed tree.

The growth form of juniper is not ideal for extracting lumber. Junipers tend to be short (20 to 30 feet), with a high degree of taper (diameter at root collar 12 to 36 inches), and include a wide array of multi-stemmed tops. Historic uses of juniper have included mainly fence posts and firewood. Recently juniper has been studied to create other products such as: cement/wood fiber composites, particleboard, hardboard, fencing, decking, wall paneling, flooring, veneer, furniture, and novelty items. The logging costs of juniper are very high due to its growth form and the low stand densities. Log to residue ratios for processing juniper in the woods are very low compared with other traditional timber species. On the Modoc, timber harvesting of traditional conifers (pine, fir, cedar and Douglas-fir) occurs regularly, leaving forest residues available for biomass energy use. However, the harvesting of juniper will produce greater amounts of forest residue due to its inherent growth form. Excess residues can then be used for biomass energy generation.

5.2 Moisture Content

For biomass utilization, moisture content of wood chips is a very important factor to take into consideration, specifically in regards to haul costs. For example, when a harvesting operation occurs for the purpose of biomass utilization, the biomass is run through a chipper to load into a haul truck. If the wood chips were derived from live trees (green chips), then they will have very high moisture content. One truck load of green chips hauled to a biomass facility will increase the transportation cost because a large portion of the truck load will be the moisture within the wood chips. To adjust for this and reduce haul costs, biomass should be stacked at landings for no longer than one year. This will let the moisture content in the wood to naturally decrease. The following year the biomass will weigh considerably less, reducing haul costs significantly. Further, the biomass will contain the optimal moisture content properties for combustion in a biomass energy facility.

According to BLM officials, on average the moisture content of a live standing juniper is 50%. Further, if a juniper is cut and left on site for three summer months, then it will have roughly 10 – 20% moisture content.

5.3 Specific Gravity of Wood

The specific gravity of wood is a unit-less measurement of the density of wood. It is calculated as the dry weight of a wood sample, divided by the green volume of the wood sample, multiplied by the density of water. For example, a specific gravity of 0.30 would contain much less weight than a specific gravity of 0.70, for a given volume of wood. Juniper has a specific gravity of 0.44, which is very high compared to other conifers (Table 5.1).

Table 5.1. Specific gravity values for species occurring on the Modoc.

Tree species	Specific Gravity
Western juniper	0.44
Douglas-fir	0.45
Ponderosa pine	0.38
Jeffery pine	0.37
Incense cedar	0.37
White fir	0.37
Lodgepole pine	0.38

Western juniper is amongst the densest tree species growing on the Modoc. Specific gravity values may seem small or insignificant, however, when calculating biomass weights, the smallest change in specific gravity can have a significant effect on the calculated weight. For example, 100 ft^3 of juniper will have a bone dry weight of 2,745 pounds. The same volume of ponderosa pine will have a bone dry weight of 2,371 pounds, a difference of 374 pounds of bone dry biomass. When calculating biomass weights across a landscape, this slight change of specific gravity can dramatically affect the estimate of biomass availability.

5.4 Energy Content of Wood

The energy content of wood is another important factor to take into consideration when assessing biomass utilization. Energy content is closely related to specific gravity of wood. Usually, the denser the wood is, the higher the energy content it contains within a given volume. However, there are other variations of chemical compositions within wood that allow for different energy contents. For example, some pine species have very high amounts of resign that will produce similar amounts of energy to juniper for a given volume. However, resinous materials tend to burn "dirty" and leave unwanted residues in ovens or boilers. Overall, the energy content of most conifers is between 8,000 to 9,000 BTU's (British Thermal Units) per one pound of bone dry wood. Juniper is on the higher side (8,700 Btu/lb) whereas white fir is on the lower the lower side (8,300 Btu/lb).

The take home message regarding biomass fuel characteristics is that denser wood with higher energy content is the best type of forest biomass. The transportation costs will decrease, while the energy produced will increase. Juniper is an excellent source of woody biomass due to its specific gravity and energy content.

5. Forest Biomass Costs

5.1 Pre-treatment analysis costs

On public lands a NEPA document is required to be completed before any treatments are allowed. The NEPA costs are highly variable due to site-specific qualities. The scale of the project is a very important variable to assess. Generally, larger scale projects require fewer costs per acre. Wildlife biologists, botanists, archeologists, rangeland scientists, and other environmental experts generally are required to review aspects of the project that can vary in costs. However, the greatest cost for pre-treatment analysis is the archeological surveys. According to BLM officials, the average cost for archeological surveys is $30 per acre. When dealing with projects that are up to 2,000 acres, the archeological surveys add up quickly to $60,000.

5.2 Collection and processing costs

There are numerous variables that need to be taken into consideration when removing juniper biomass from the forest to a biomass facility. The main factors to take into consideration are: 1) haul distance to the biomass facility, 2) juniper stand density, 3) moisture content of juniper chips, 4) cost of diesel, 5) cost of labor, 6) time of year for delivery and 7) road maintenance and improvement.

A recent study in the Big Valley area revealed that the cost of western juniper removal ranged from $44 - $63 per bone dry ton, assuming a one-way haul distance of 30 miles. On the

Modoc, the majority of the juniper stands are on gentle grounds with slopes less than 30%. However, a major obstacle for harvesting juniper is the geology of the ground. Many areas on the Modoc have rocky outcroppings that make it very difficult, if not impossible, to harvest juniper. Further, when using a feller-buncher for harvesting, the blades can wear out quickly from grinding into rocks. In addition, rubber tire skidders can experience severe wear and tear on the tread from traveling over coarse rocks.

The moisture content of juniper chips is also important in determining haul costs. For example, freshly cut juniper that is immediately chipped (green chips) and loaded into a standard haul van, equates to roughly 12 bdt per load. If the juniper is left on site for three summer months to dry, then chipped and loaded, it would equate to roughly 17 bdt per load. This means that the cost of diesel per load would be reduced if the chips were not hauled green.

According to BLM officials who have been conducting contracts for juniper removal, the costs per acre for removal vary greatly. There are many variables that can exist for an individual unit causing the bid for removal to range from $150 to $500 per acre. Slope, topography, geology, distance to biomass facility, and the current financial needs of individual contractors are main variables that dictate the costs to remove. In this report, an extended analysis of the costs to remove juniper was not conducted due to the numerous variables that can exist within the local economies.

6. Economic Impacts of a Biomass Facility on the Modoc

6.1. Current available workforce

Currently there are numerous contractors surrounding the Modoc that would likely bid on chipping and hauling projects. In northern California, most contractors will travel far distances to complete contracts. The Modoc is not far from Redding, CA which is the most populated city in the far northern section of the state. Further, Klamath Falls, OR is a fairly high populated city that is near the Modoc. In addition to these cities, there are numerous rural towns within the region where contractors can be located.

6.2 Job creation

In 2003, the California Biomass Energy Alliance reported that there were roughly six jobs created per one MW of biomass produced electricity. Estimated annual earnings per job description ranged from $20,000 to $60,000. Further, these jobs that were created were all in rural areas where job creation was highly needed. On the Modoc, it can be assumed that with a 5 MW biomass energy facility, roughly 30 people would be directly employed at the facility. Additional job creation would also be experienced through competitive private contracts for chipping and hauling biomass. A biomass feasibility assessment for Oregon (Biomass Resource Assessment and Utilization Options for Three Counties in Eastern Oregon, 2003) reported that a

5 MW biomass energy facility would employ 18 people in the fuel procurement sector. Total direct job creation for a 5 MW biomass energy facility would approximate 48 positions. This would be a significant amount of job creation for the Modoc, which would improve the struggle with poverty, increase local tax revenues, and create additional secondary economic impacts for businesses on the Modoc.

Conclusion

After carefully reviewing many factors regarding biomass utilization in Modoc County, we recommend that a biomass facility be installed on the Alturas old mill site. This report has shown that there will be approximately 160,000 – 200,000 bone dry tons of biomass available annually on the Modoc. The Alturas old mill site is closest to available feedstocks, which reduce costs associated with haul distances. Further, the geographic location of Alturas is strategically located from competing biomass facilities in the region. All competing biomass facilities are too far away from most of the Sage Steppe to support economic haul distances. Further, the infrastructure of the old mill at the Alturas site would be beneficial for utilizing waste heat for processing forest products. The most efficient use of biomass to create energy is to utilize both components of cogeneration.

Additional benefits of a biomass facility operating in Alturas are the added values of ecosystem restoration. The installation of a biomass facility would increase the demand for wood chips in the local area and facilitate restoration efforts on the Modoc.

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Appendix A: Next 47 Year Juniper Biomass Availability on the Modoc

Acres of juniper to be

mechanically removed

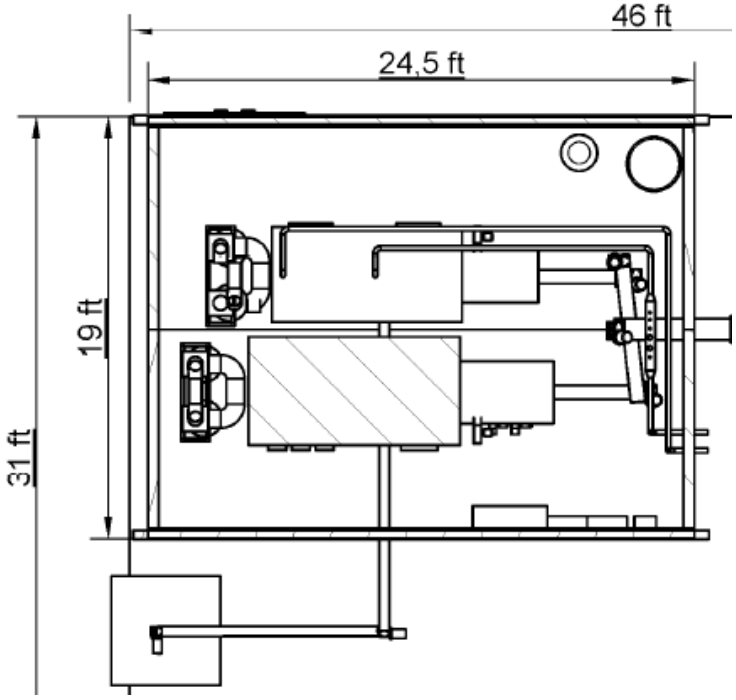
Year	Public Lands	Private Lands	Biomass (bdt)
2011	3,080	10,000	167,424
2012	3,080	10,000	167,424
2013	3,080	10,000	167,424
2014	3,080	10,000	167,424
2015	3,080	10,000	167,424
2016	3,080	10,000	167,424
2017	3,080	10,000	167,424
2018	3,080	10,000	167,424
2019	3,080	10,000	167,424
2020	3,080	10,000	167,424
2021	4,620	10,000	187,136
2022	4,620	10,000	187,136
2023	4,620	10,000	187,136
2024	4,620	10,000	187,136
2025	4,620	10,000	187,136
2026	4,620	10,000	187,136
2027	4,620	10,000	187,136
2028	4,620	10,000	187,136
2029	4,620	10,000	187,136
2030	4,620	10,000	187,136
2031	7,480	10,000	223,744
2032	7,480	10,000	223,744
2033	7,480	10,000	223,744
2034	7,480	10,000	223,744
2035	7,480	10,000	223,744
2036	7,480	10,000	223,744
2037	7,480	10,000	223,744
2038	7,480	10,000	223,744
2039	7,480	10,000	223,744
2040	7,480	10,000	223,744
2041	7,480	10,000	223,744
2042	7,480	10,000	223,744
2043	7,480	10,000	223,744
2044	7,480	10,000	223,744

Year	Public Lands	Private Lands	Biomass (bdt)
2045	7,480	10,000	223,744
2046	7,480	10,000	223,744

2047	7,480	10,000	223,744
2048	7,480	10,000	223,744
2049	7,480	10,000	223,744
2050	7,480	10,000	223,744
2051	7,480	10,000	223,744
2052	7,480	10,000	223,744
2053	7,480	10,000	223,744
2054	7,480	10,000	223,744
2055	7,480	10,000	223,744
2056	7,480	10,000	223,744
2057	7,480	10,000	223,744

Proposed System for Alturas District Heat from BES

We propose the installation of a 1.5 MW boiler system (5.1 million BTU). The hot water boiler, wood chip burner, heat exchanger, cyclone for flue gas cleaning, back burn protection and the control system, would be all housed in a double-container unit. This double container unit is visually appealing and can be delivered in customized colors. The system would be comprised of two 750KW boiler, each equipped with a accordingly sized wood chip burner. This combination allows running the system smoothly at different capacities throughout the year. The containerized system includes two containers, both equipped with a slanted roof. Each container unit is fully assembled at the factory and delivered by truck. At the site, a simple concrete foundation will be prepared. The boiler containers will then be lifted by crane of the delivery truck and placed next to each other onto the concrete foundation, mirroring each other and working together as a unit.



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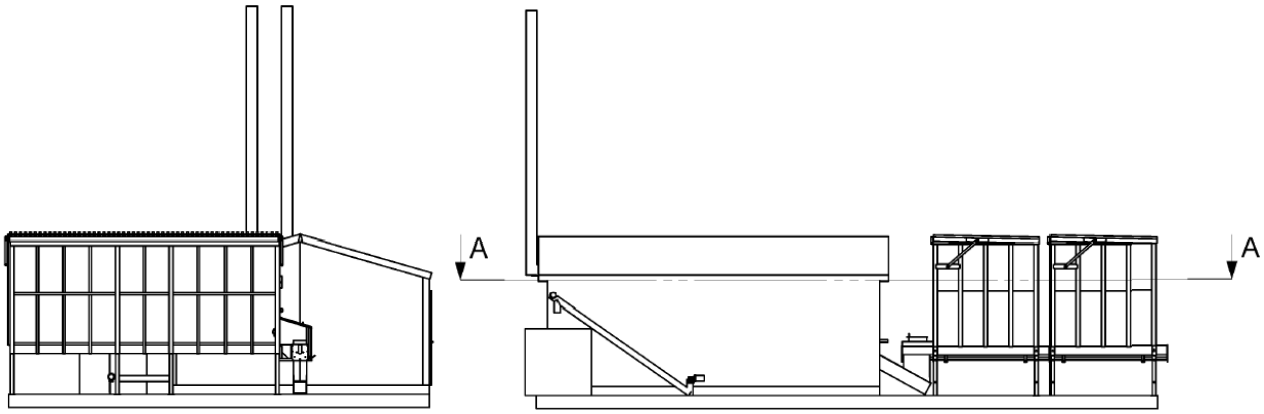

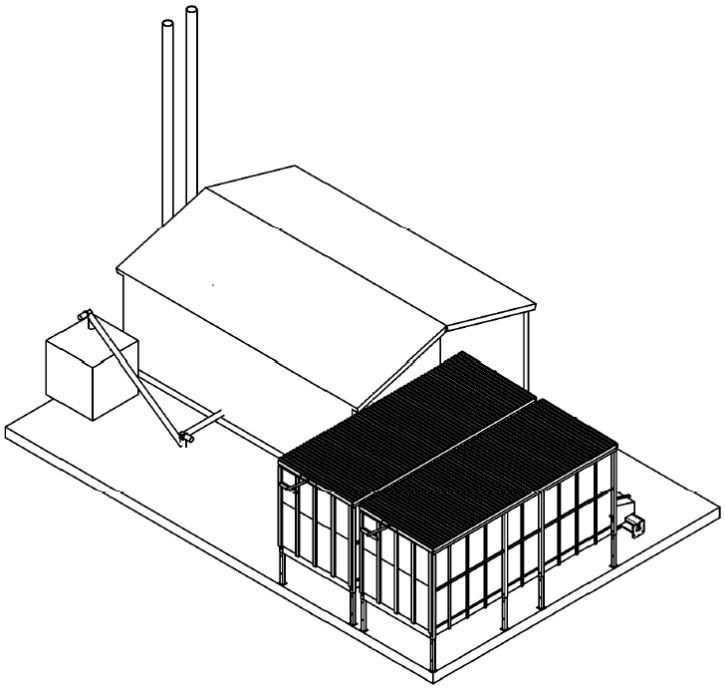

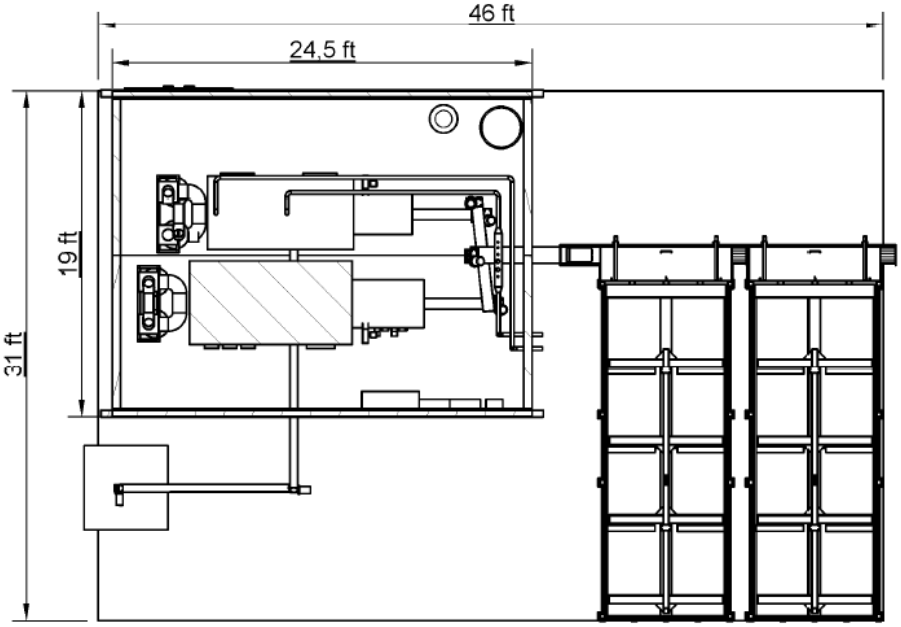

SWEBO BIOENERGY AB • **HEAD OFFICE** BODEN • **LOCAL OFFICES** GÖTEBORG
TELEPHONE (SWITCH BOARD) +46 921 578 00 • **FAX** +46 921 176 73 • **E-MAIL** INFO@SWEBO.COM • I**NTERNET** WWW.SWEBO.COM

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The advantage of such containerized solution is that:

- The equipment is pre-assembled at the manufacturer's plant and can be installed within three work days at the site if the simple concrete foundation is prepared.
- It saves considerably in construction costs
- It avoids a lengthy planning process
- It reduces greatly the project risk (few unknowns)
- It is considered mobile equipment, not real estate
- All pieces are proven to work together and selected by the manufacturer, no risk of faulty parts

The containerized system can be connected easily to an available hydronic system.

The system will be equipped with a cyclone for flue gas cleaning.

Maintenance work required is typically less than one hour per week. Swebo offers a service agreement under which they would visit, inspect and re-adjust the boiler system three (3) times per year. The boiler system uses an advanced control system which can be accessed remotely by the school, a local fuel supply company or Swebo.

This containerized boiler system can be combined with various types of wood chip storage solution available from Swebo Bioenergy Inc. Besides the traditional designs for wood chip storage and wood chip reclaiming, Swebo offers an integrated wood chip transportation / storage /reclaiming solution which we believe to be most appropriate for the district heating complex and would like to propose.

The Swebo S.M.S container system is a roll-off container. This container is equipped with a scraper floor. The container is filled with wood chips by the fuel supplier and trucked to the school. It is simply rolled of the truck onto a docking station. The docking station is basically an auger moving the wood chips to the boiler. The entire system is controlled by the central control system and works automatically. Once the container is empty, the fuel supplier exchanges the empty container for a full one. Given the size of the wood chip boiler needed by the district heating complex, we suggest the installation of two containers. A third container will be delivered to allow for a smooth operation of the fuel supplier. This system has the following main advantages:

- The construction costs are significantly reduced since the typical below-ground wood chip storage system is not needed
- Drastic reduction in construction and planning time
- No wood chips are unloaded on school property, wood chips stay always nicely contained
- Allows smooth integration with wood chip supplier
- Integrated solution for storage and transportation

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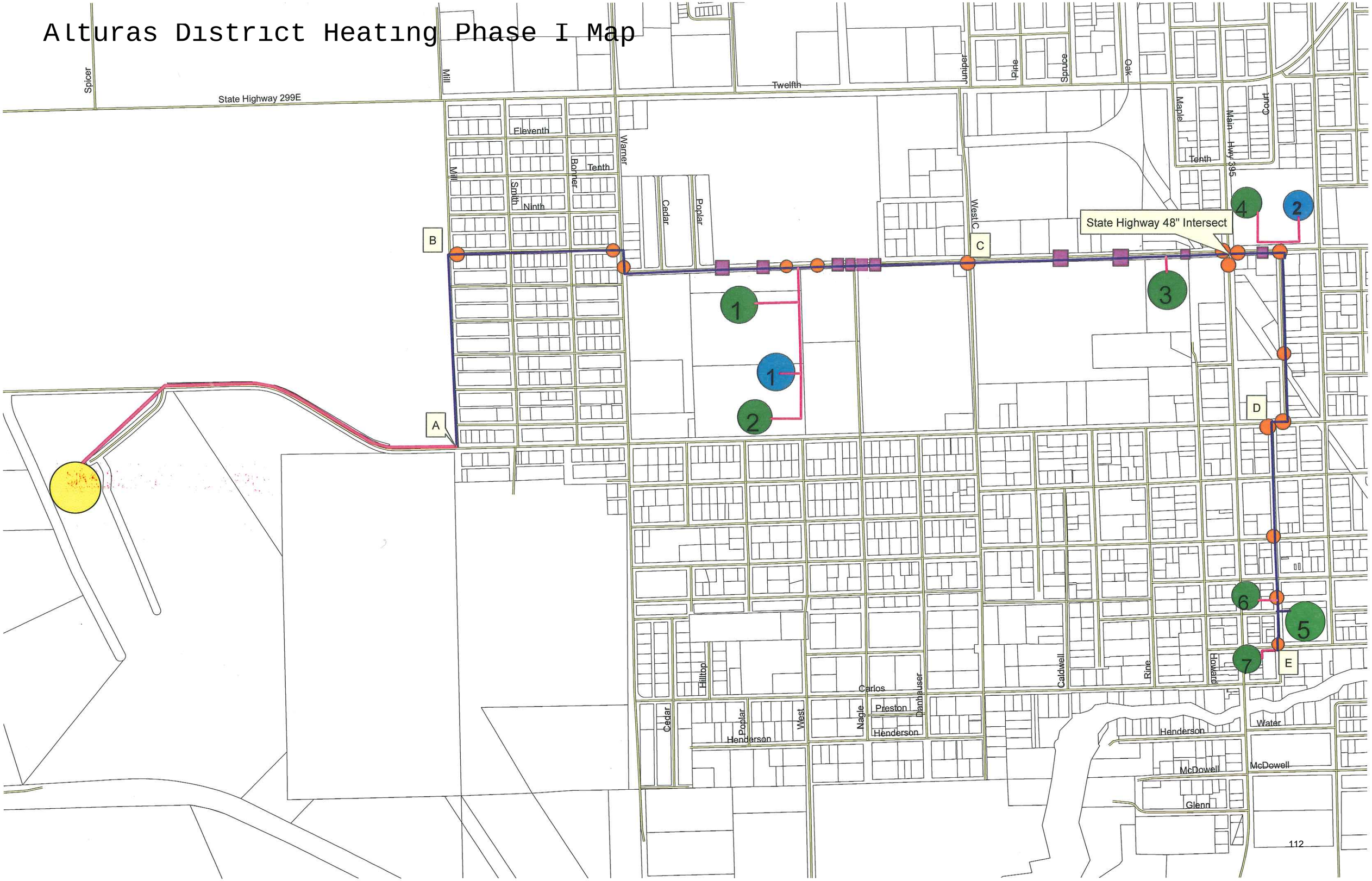
District Heat Building Data

	Facility	Facilities Manager	Phone #	Address	Sq. Ft	Fuel used	Gal/Yr Propane	Annual Cost	Kilowatt/yr
1	Courthouse	Rick Hironymous	233-6403	204 South Court Alturas, CA	4,500	Diesel			
2	Social Services	Rick Hironymous	233-6403	Alturas, CA	4,000	Propane	3300	$ 6,930.00	
3	Agriculture Department	Rick Hironymous	233-6403	202 West 4th St. Alturas, CA	3,500	Electric & Monitors	700	$ 1,490.00	38400
4	Planning Department	Rick Hironymous	233-6403	203 West 4th St.	2,500	Electric Heat pump			14400
5	Road Department	Rick Hironymous	233-6403	1610 Oak St.	5,000	Propane	4800	$ 10,080.00	
6	Library - Alturas	Rick Hironymous	233-6403	212 W 3rd Alturas,	3,000	Electric			45600
7	Sheriff Office/Jail	Rick Hironymous	233-6403	Alturas, CA	5,000	Electric			280000
8	Sheriff Annex	Rick Hironymous	233-6403	102 S. Court St.	1,000	Electric			48000
9	Public Health Department	Rick Hironymous	233-6403	441 N. Main St. Alturas, CA	2,500	Electric			35000
10	Building	Rick Hironymous	233-6403	Near Court House	1,000	Propane	3000	$ 6,300.00	
15	Barclay Justice Center	Rick Hironymous	233-6403	205 S. East St.	3,000	Propane and Diesel	3600	$ 7,560.00	
11	Elementary/Middle-Alturas	Lane Bates			27,000	Diesel			
12	Modoc Joint Unified School Dist	Jimmy Lloyd	640-1944	906 W. 4th St.	Included with Elementary School				
16	City Hall - Alturas	Chester Robertson	233-2377	200 W. North St.	6,500	Propane	1025	$ 2,153.00	
17	Fire Department	Chester Robertson	233-2377		2,080	Propane	2647	$ 5,559.00	
18	Fire Hall	Chester Robertson	233-2377		4,800	Propane & Electric	1068	$ 2,243.00	
19	Swimming Pool - Alturas	Chester Robertson	233-2377	1112 W. 4th		Propane & Solar	162	$ 340.00	
13	Post Office-Alturas	Karen Brazier	233-2410	240 N. Main St. Alturas, CA	5,400				
14	DMV/CHP - Alturas			903/905 W. C St. Alturas, CA	10,000				
20	Elks Building (Old RR building)	Jed Parkinson	233-8850	Main & 8th Alturas	5,000	Currently Electric			
				Totals	95,780		20,302	$ 42,655.00	461,400

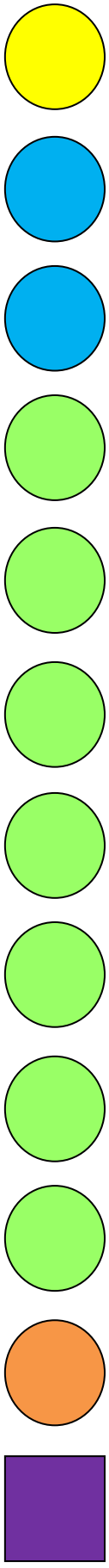
District Heat Building Data

	Facility	Annual Cost	Gal/yr Diesel	Annual Cost	How heat is distributed	Notes
1	Courthouse		8000	$ 25,000.00	Fuel Oil Boiler, low pressure steam	3 story, 1914
2	Social Services				Forced air	2 story
3	Agriculture Department	$ 4,608.00			Radiant heat	Brick '60 & '70's
4	Planning Department	$ 1,728.00			Forced air	Year 2000
5	Road Department				Forced air	
6	Library - Alturas	$ 5,472.00			Radiant heat	Block '60's + Modular
7	Sheriff Office/Jail	$ 33,600.00	9600	$ 30,000.00	Forced air	79 +'94 add on
8	Sheriff Annex	$ 5,760.00			Forced air	2001
9	Public Health Department	$ 4,200.00			Radiant heat	Rental, Utilities pd separately
10	Building				Forced air	60's
15	Barclay Justice Center		5000	$ 15,625.00	Forced air	60's Block + '94 addon
11	Elementary/Middle-Alturas		16510	$ 51,593.00		TSS Estimated 2,524,379,000 BTU's/yr
12	Modoc Joint Unified School Dist					
16	City Hall - Alturas				HVAC Ducting in ceiling	1982 Includes Police Station-600'
17	Fire Department				Propane space heaters	1906 -2 story Stone, no insulation
18	Fire Hall				Propane space heaters, Electric units	Old Building
19	Swimming Pool - Alturas					Propane for water heater and buildings, Solar for pool 40 x 70 4'-9' deep
13	Post Office-Alturas					Newer Maybe 1999-Additional information not gathered.
14	DMV/CHP - Alturas					1990's- Additional information not gathered.
20	Elks Building (Old RR building)		3250	$ 8,400.00		Old Building, has old boiler etc. still in place. Needs new windows etc. 2 story. Diesel information from '07-'08
		$ 55,368.00	42,360	$ 130,618.00		

Alturas District Heating Phase I Map



Alturas District Heating Phase 1 Map Key



Mill Site – Biomass Location/Discharge Location

#1: Elementary School – Geothermal Well

#2: High School – Geothermal Well

#1: Elementary School

#2: Middle School

#3: USDA Building

#4: High School

#5: Modoc County Court House

#6: Modoc County Transportation Commission

#7: Niles Hotel

Likely Abandoned Water Main/New Water Main Intersects

Unlikely Abandoned Water Main/New Water Main Intersects

	Existing Abandoned Water Main – Aprox. 11,200 Feet
	Lines Needed to Connect to Existing Main – Aprox. 7,000 Feet
A-B	Existing Abandoned Water Main – 6” Pipe
B-C	Existing Abandoned Water Main – 8” Pipe
C-D	Existing Abandoned Water Main – 12” Pipe
D-E	Existing Abandoned Water Main – 8” Pipe

Pre-work for RFP for District Heating Pre- Engineering Study

Boiler

1. Size(capacity)
2. Cost
3. Operation and maintenance (requirements and costs)
4. Environmental impact(air quality, ash disposal)
5. Fuel consumption
6. Cost of fuel
7. Fuel delivery system
8. Fuel availability

Piping system

1. Piping size
2. Pipe description(flex/rigid)
3. Integration within abandoned water mains
4. Cost of repairing splices from new water system installation
5. Cost per ft for trenching/backfill
6. cost of building T's.
7. Cost of adding T's for Phase 2

Building customers

1. Hook-up costs
2. Delivery mechanism alternatives
3. Demand load/design per building
4. Cost of energy given target payback period(<8 years)

Strategy

BES recommendation was to house the heating system on 4th street as most cost effective location in relation to heat demand locations. The 4th street location allows for limited expansion.

1. Compare the costs of locating the system on 4th street with cost of millsite location.

BES estimated the boiler size for the identified public buildings as 1.5 mW(2 boilers@.75 mW each).

2. Compare incremental increases in boiler capacity with corresponding increases in capital cost to identify optimized boiler capacity and per BTUH capital cost.
3. Identify additional building and building loads to substantiate boiler optimization either for inclusion as part of phase 1 or as phase 2 in an effort to insure acceptable payback period as reflected in estimated necessary heating cost to building owners.
4. Check existing public building list included in FEMP application as identified in BES report for phase 1 to insure subsequently identified public buildings are included.
5. Generate list of previously identified private, commercial buildings as part of phase 2, but which could be included in phase 1 if necessary.

Determine whether Pacific Corp has a commercial energy audit program that could be applied to Alturas buildings within district heating loop. This could reduce grant-supported engineering costs and facilitate analysis of non-heating conservation measures that would reduce overall demand.

Given the available engineering funding of $50,000, determine the hierarchy of required information, including all information initially, then reducing catagories to match cost to deliverables. Example: heat loss calculations have higher need than individual building zone delivery capital costs. This means that the target payback would need to allow for individual hook-up and delivery costs and still achieve <8 year payback.

Regulatory Requirements/Permits

No regulatory requirements or permits pertain to this project. Project is for planning purposes only.

California Environmental Quality Act (CEQA)

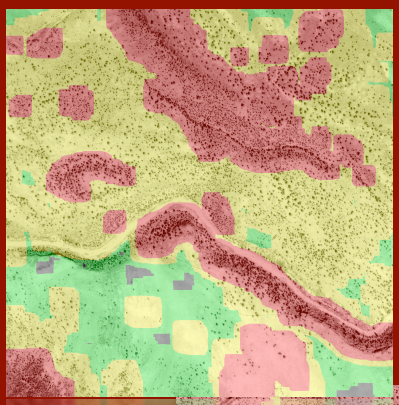
The action is not defined as a “project” under CEQA and therefore is not subject to CEQA review. The action is an engineering planning study only.

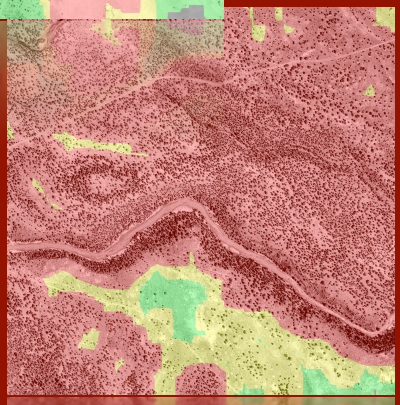
National Environmental Policy Act (NEPA)

This planning project does not require NEPA. The SAGE STEPPE EIS will apply during the implementation phase. See executive summary of the EIS below:

SAGE STEPPE ECOSYSTEM RESTORATION STRATEGY

FINAL ENVIRONMENTAL IMPACT STATEMENT





Modoc National Forest
Alturas Field Office BLM
Modoc County

April 2008
R5-MB-161

United States Department of Agriculture

Modoc National Forest
800 West 12th Street
Alturas, CA 96101
(530) 233-5811
TTY (530) 233-8708

Bureau of Land Management
Alturas Field Office
708 W. 12th Street
Alturas, CA 96101

United States Department of Interior

April, 2008

Dear Reader:

We are pleased to announce the availability of the Sage Steppe Ecosystem Restoration Strategy Final Environmental Impact Statement (FEIS). This document was completed by the USDA-Forest Service, USDI-Bureau of Land Management and Modoc County, California as a Cooperating Agency. The document was prepared using public comments received during the scoping phase and the Draft Environmental Impact Statement (DEIS) comment period of this planning effort.

The geographic analysis area contains approximately 6.5 million acres, including lands managed by the Modoc National Forest, the Klamath National Forest, the Shasta-Trinity National Forest, and the Alturas, Surprise and Eagle Lake Field Offices of the Bureau of Land Management. The overall intent of this planning effort is to develop a strategy for the restoration of sage steppe habitats at a programmatic, landscape scale.

This FEIS has been developed in accordance with the National Environmental Policy Act of 1969, the Federal Land Policy and Management Act of 1976, and the laws and regulations specific to USDA- Forest Service and USDI- Bureau of Land Management. The FEIS incorporated public comments received from the Sage Steppe Ecosystem Restoration Strategy DEIS that was released on August 31, 2007. These public comments resulted in the addition of a new alternative, Alternative J, which is the Forest Service's and Bureau of Land Management's Preferred Alternative.

As this is a joint planning effort between the Bureau of Land Management and Forest Service, administrative procedures related to the issuance of the FEIS vary by agency. Details are listed below.

Bureau of Land Management:

This FEIS has been filed with the Environmental Protection Agency and is available on the Bureau of Land Management's (BLM's) Alturas, Surprise, or Eagle Lake Field Office websites (***http://www.blm.gov/ca***) or by mail upon request. BLM will issue a Record of Decision (ROD) no sooner than 30 days following publication of the FEIS Notice of Availability in the *Federal Register.*

Forest Service:

The FEIS is available on the Modoc National Forest website (**www.fs.fed.us/r5/modoc/projects/sagebrush-restoration-web/juniperstrategy.shtml**) . It has not yet been determined whether the Forest Service will issue a Record of Decision (ROD) for this FEIS, or incorporate the analysis into its upcoming Forest Plan Revision. If a ROD is issued, Forest Service regulations provide for a 45-day appeal period, subsequent to the issuance of the ROD. The ROD would specify the proper procedures for filing an appeal. The ROD would be posted on the website above and sent to those individuals and groups who request a copy.

Timing for Decisions

It is anticipated that the Bureau of Land Management will issue a ROD once consultation with the U.S. Fish and Wildlife Service has been completed, but no sooner than 30 days following the publication of the Notice of Availability for this FEIS in the *Federal Register.* Consultation with the U.S. Fish and Wildlife Service is expected to be complete within 60 days after issuance of this FEIS. If the Forest Service issues a ROD, it would likely be issued at about the same time as the Bureau of Land Management.

FOR FURTHER INFORMATION: For further information, or to request a copy of the FEIS or Records of Decision, when issued, contact Rob Jeffers, Project Lead, U.S. Forest Service, 800 West 12th Street, Alturas, CA 96101, or email your request to **ljwilliams@fs.fed.us**.

SUPPLEMENTARY INFORMATION: Copies of the FEIS documents for the Sage Steppe Ecosystem Restoration Strategy have been sent to affected federal, state, and local government agencies and to interested parties. Copies of the FEIS are available for public inspection at the BLM Alturas Field Office, 708 West 12th Street, Alturas, CA, and the Modoc National Forest, Supervisor's Office, 800 West 12th Street, Alturas, CA. Interested persons may also review the FEIS on the Forest Service and Bureau of Land Management websites listed above.

The Forest Service and BLM would like to thank our Cooperating Agency partner, Modoc County. County staff and the Modoc Land Use Committee played an integral role in completing this document. We also extend thanks to those individuals and organizations that have provided extensive information and many excellent ideas that have been considered during this process.

Sincerely,

Stanley G. Sylva
Forest Supervisor
Modoc National Forest

Timothy J. Burke
Field Manager
Alturas Field Office

Sage Steppe Ecosystem Restoration Strategy

Final

Environmental Impact Statement

Modoc, Lassen, Shasta and Siskiyou counties, California and Washoe County, Nevada

Lead Agency:	USDA Forest Service
Cooperating Agencies:	USDI Bureau of Land Management Modoc County, California
Responsible Official:	Stanley Silva, Forest Supervisor Modoc National Forest 800 West 12th Street Alturas CA 96101
For Information Contact:	Rob Jeffers, Project Lead Modoc National Forest 800 West 12th Street Alturas CA 96101 530-233-8816

Abstract:

The Modoc National Forest, Bureau of Land Management and partner agencies including Modoc County, California, are cooperating in developing a management strategy and environmental impact statement. The Sage Steppe Ecosystem Restoration Strategy focuses on the restoration of sage steppe ecosystems that have come to be dominated by juniper, as the density of Western juniper has increased over the landscape. The management strategy will broadly identify appropriate restoration methodologies by ecological conditions; provide guidelines for design and implementation of effective restoration treatments for restoration areas to be analyzed site specifically over a 50-year horizon.

The Forest Service and BLM developed five alternatives to the Proposed Action, including the Current Management alternative. These alternatives were developed in response to issues raised by the public, relating to the Proposed Action. The four action alternatives include one that proceeds slower, one that changes the mix of treatments, one that proceeds faster and changes the mix of treatments and one that proceeds slower and changes the mix of treatments.

Summary

The U.S. Department of Agriculture's Modoc National Forest (FS) and U.S. Department of the Interior's Bureau of Land Management, Alturas Field Office (BLM); and Cooperating Agency, Modoc County, California, are developing a Restoration Strategy and associated environmental impact statement (EIS). The Sage Steppe Ecosystem Restoration Strategy EIS focuses on the restoration of sage steppe ecosystems that have come to be dominated by juniper, as the density of Western juniper has increased over the landscape. The Restoration Strategy will broadly identify appropriate restoration methodologies by ecological conditions; and provide guidelines for design and implementation of effective restoration treatments for restoration areas to be analyzed site specifically over a 50-year horizon.

The Analysis Area covers approximately 6.5 million acres of public and private land. Within the Analysis Area, there is an identified Focus Area that contains the sage steppe ecosystem and includes all areas that are proposed for restoration treatment. The Focus Area is more than 4 million acres and contains a large percentage of BLM and private lands. Restoration projects would occur on National Forest lands and public lands administered by the BLM in parts of Modoc, Lassen, Shasta and Siskiyou Counties, California and in Washoe County, Nevada. Lands other than FS and BLM administered lands are taken in consideration in this analysis to provide contextual information to guide decision-making by the two agencies.

Purpose and Need for Action

The purpose of this Restoration Strategy is to adopt an approach for juniper management on National Forest System and Bureau of Land Management lands encompassed by the 6.5 million acre Analysis Area, in order to restore the sage steppe ecosystem and associated vegetative communities to desired habitat conditions reflecting ecological processes that existed pre-European settlement. This action is needed because of the loss of the sagebrush ecosystem across the landscape as the density of juniper has altered many sites from sagebrush steppe to juniper woodlands dominated. The cause of this ecological shift is predominately due to anthropogenic changes, and the associated loss of vegetative, habitat, and hydrologic values. The purpose of this Restoration Strategy is to restore sage steppe ecosystems that have become dominated by Western juniper woodlands due to human causes.

More specifically the purpose of this Restoration Strategy is to restore sage steppe ecosystem processes and vegetation conditions that resemble historic mosaics, so that historic fire return intervals in sage steppe ecosystems can be sustained. Additional objectives include; improving watershed function and condition, restoring biodiversity and productivity, managing fuels to conform to the National Fire Plan requirements, and implementing, where appropriate, national renewable energy direction. This Restoration Strategy would restore habitat for sagebrush obligate species, improve hydrologic conditions and enhance the forage base for wildlife and domestic animals.

Miller *et al.* (2008) concludes that "*The lack of active management will potentially result in the continued decline of historic sagebrush communities, structural diversity, understory species, herbaceous production, habitat for sagebrush obligates, and landscape heterogeneity. As a greater proportion of the landscape shifts towards Phase III the risk of larger, intensive wildfires and conversion to annual exotics will increase, as will the cost of treatment, and the potential for desirable outcomes will decrease. Infilling by younger trees also increases the risk for the loss of presettlement trees due to increased fire severity and size resulting from the increase in the abundance and landscape level continuity of fuels*."

Proposed Action

Federal managers of the FS and the BLM propose to adopt a long-range Restoration Strategy to restore the sage-steppe ecosystem and related species habitat. The Proposed Action is to create an integrated, landscape-scale management Restoration Strategy that restores the sage steppe ecosystem across a 6.5 million acre Analysis Area. This Restoration Strategy focuses on the conditions of the sage steppe ecosystem that is targeted for restoration. Within the Analysis Area, there is an identified Focus Area that contains the sage steppe ecosystem and includes all areas that are proposed for restoration treatment. Primary methods to be employed for restoration include fire use, mechanical restoration and hand restoration. Using this integrated approach, the federal land managers propose to treat up to 30,000 acres per year across FS and BLM lands. The mix of restoration methods would be about 19 percent of the area restored by mechanical methods; 78 percent using fire; and three percent using hand treatments. This Restoration Strategy is a programmatic, landscape-scale approach to restoration. The treatments would require site-specific environmental analysis to meet the objectives of the proposed Restoration Strategy and obtain federal agency approval prior to implementation.

This EIS may provide the basis for amending or revising FS and BLM respective land management plans, as appropriate. The Modoc National Forest anticipates revising its Forest Land and Resource Management Plan (USDA Forest Service 1991a) in the next several years. The analysis from this EIS will be incorporated into the revision process. The Lassen, Shasta Trinity and Klamath National Forests may use the information contained in this EIS as appropriate. The new Resource Management Plans for the Alturas, Surprise and Eagle Lake Field Offices of the Bureau of Land Management have been designed to accommodate decisions arising from the Restoration Strategy.

Background

The Sage Steppe Ecosystem Restoration effort began in a series of informal discussions between the Alturas Field Office of the BLM, the Modoc National Forest, and the North Cal-Neva Resource Conservation and Development Council that focused on wildlife habitat loss, accelerating juniper density, soil surface degradation, and forage loss. Resource Concepts, Inc. an engineering and environmental consulting firm from Carson City, Nevada was contracted to

develop a concept paper detailing the agencies' concerns, and presenting a strategic approach for future management. The product was entitled, "Western Juniper Management Strategy and Planning Proposal Analysis", and was submitted to the agencies on August 7, 2001.

This concept paper provided the foundation for numerous informal discussions with a wide array of public and private entities, as the problem statement and the strategic approach were refined and developed. Informal discussions were held with approximately 32 agencies, organizations, tribal entities, legislators, and individuals from 2000 to 2004.

Additionally, agency representatives specifically discussed the sage steppe/juniper initiative on 18 separate occasions with the Modoc County Resource Advisory Committee, between December 1, 2001 and August 2, 2004. Agency representatives also discussed the initiative with the BLM's Northeast California/Northwest Nevada Resource Advisory Council on 13 occasions between June 2000 and August 2004. Further, the agencies met with the Modoc-Washoe Experimental Stewardship Steering Committee four times between February of 2003 and June of 2005; and the Modoc County Land Use Committee 17 times from August of 2002 to August of 2005.

In a final effort to refine and further develop the agencies proposed Restoration Strategy prior to distribution of the Notice of Intent, which marked the beginning of the formal scoping period, eight public meetings were held throughout the Analysis Area to solicit public comments.

The Notice of Availability (NOI) of the Draft EIS was published in the Federal Register on August 31, 2007. During the comment period nine public meetings, presentations and field trips were offered throughout the Analysis Area. A total of 40 people attended the public meetings. In addition several people attended the two field trips.

The DEIS public comment period ended on October 15th, 2007. During that 45-day comment period 23 comment letters were received. These comment letters were analyzed using the same method that was used on the scoping comments. Three comment letters were received well after the end of the comment period and therefore were not analyzed. However, in reviewing those letters, it was concluded that the issues raised are substantially encompassed within comments submitted during the comment period and that the response to comments addresses their issues. Responses to all substantive comments received during the comment period are presented in Appendix A.

Based upon public comments on the DEIS an additional alternative (Alternative J) was added to the Final EIS. Alternative J has been identified by the agencies as the Preferred Alternative.

Issues

Public scoping generated some concerns about the Sage Steppe Ecosystem Management Strategy. Thirteen issues were developed from public scoping and are described below.

Issue 1 – Restoration Rate

Issue Statement: The restoration rate in the Proposed Action will not keep up with juniper expansion to fully meet the purpose and need. The restoration treatments in the Proposed Action would restore 25,000 to 30,000 acres per year. This rate could not restore the existing sage steppe acres that have been encroached upon and keep up with new juniper expansion in a foreseeable time frame.

Issue 2 – Permanent Roads

Issue Statement: New permanent roads created for restoration treatment activities may cause negative environmental effects such as the spread of noxious weeds, increased OHV use of the area, increased soil erosion, negative impacts to wildlife habitat, and other associated management problems.

Issue 3 – Uncertain Results

Issue Statement: Treatments could result in further degradation of sage steppe biodiversity, and not restoration. There is uncertainty as to whether the most degraded sage steppe areas will respond to treatment. Uncertainty must be addressed through adequate monitoring and adjustment through time.

Issue 4 – Livestock Grazing Impacts on Restoration Effectiveness

Issue Statement: Improper timing and intensity of livestock grazing can reduce plant vigor, create bare ground leading to erosion of the top soil, prevent historic fire return intervals due to removal of fine fuels, and retard restoration response after mechanical or fire treatments. The Proposed Action would not be effective in restoring the sage steppe ecosystem if it does not address the impacts of livestock grazing.

Issue 5 – Impacts on Livestock Industry

Issue Statement: Implementation of 25,000 to 30,000 acres of restoration per year with anticipated two years of rest following mechanical or fire treatments and a year of rest prior to prescribed fire treatments may have an adverse economic impact on the local livestock industry. Most suitable grazing land in the Analysis Area is being utilized and therefore livestock have little alternative range to use during rest periods. The project may cause ranchers to reduce their herds or adjust their operations, and result in substantial economic impacts on the local economy.

Issue 6 – Noxious Weeds and Non-Native Invasive Species

Issue Statement: Arid landscapes are very vulnerable to invasion by noxious weeds and non-native invasive species following mechanical and prescribed fire treatments. The Proposed Action would increase the risk of this invasion in the Analysis Area.

Issue 7 – Old Growth Juniper

Issue Statement: Old growth juniper trees exist in various locations throughout the Focus Area. These trees are a natural component and play an important role in the sage steppe ecosystem and should not be killed due to restoration treatments.

Issue 8 – Juniper Wildlife Habitat

Issue Statement: Some wildlife species such as migratory birds rely on juniper stringers and clumps. If restoration treatments fragment this habitat it would have an impact on these wildlife species.

Issue 9 – Short-term Impacts to Sage Obligate Species

Issue Statement: There would be short-term impacts on sage obligate species habitat that could outweigh long-term benefits. This may be particularly true with the widespread use of fire that could reduce the extent of sagebrush habitat in the short term.

Issue 10 – Soil Productivity and Surface Hydrologic Condition

Issue Statement: The proposed restoration treatments could result in the reduction of vegetative cover in the short term, and result in increased soil erosion, increased sediment delivery to streams and/or soil nutrient loss. Not restoring this ecosystem could also result in increased soil erosion, increased sediment delivery to streams, and/or soil nutrient loss.

Issue 11 – Native American Cultural Resources and Activities

Issue Statement: The short and/or long term vegetative changes created by restoration treatments may have effects on the integrity of Native American cultural resources. These vegetation changes may also have effects on Native American cultural practices and the gathering of traditional foods, such as the loss of habitat for culturally important wildlife and plant species. Native Americans also expressed concern that prescribed fire at a large scale may have adverse impacts to air quality.

Issue 12 – Prescribed Fire and Wildland Fire Use Implementation

Issue Statement: Burning on this scale may not be practical, particularly when environmental consequences and tactical reasonableness, such as smoke emissions and burn windows, are fully weighed.

Issue 13 – Local Economics

Issue Statement: The Proposed Action, with its heavy emphasis on prescribed fire and wildland fire use, has not considered treatment costs and local socio-economics, including opportunities for employment.

Alternatives

These issues led the agency to develop alternatives to the Proposed Action including:

Alternative A - Current Management

Alternative A, the Current Management alternative, would use existing plans to continue to guide management of the Analysis Area. Although there is no explicit BLM or FS policy regarding rest following treatment, it is generally required under Current Management practices. The current rate of restoration would be expected to continue for the next 40-50 years at approximately 5,000 acres per year of restoration within the Focus Area. The mix of restoration methods would be

similar to the Proposed Action, with about 19 percent of the area restored by mechanical methods; 78 percent using fire; and three percent using hand treatments. A total of 250,000 acres would be restored over 50 years under this alternative.

Alternative C

Theme – This alternative would proceed more slowly and cautiously with restoration activity than the Proposed Action. A Monitoring and Adjustment Approach would be used to test the effectiveness of different restoration methods and associated vegetative response. Based upon this monitoring, the pace and methods of restoration would be adjusted as appropriate before increasing the restoration rate to match the Proposed Action.

This alternative would restore about 15,000 to 19,000 acres annually for the first two decades, fewer than Alternative B (Proposed Action) because some of the Focus Area within critical sage-grouse, mule deer and pronghorn antelope habitat would be deferred until the third decade and later. The restoration methods and Focus Area would be the same as those for the Proposed Action. The majority of restoration treatments would take place on the Modoc National Forest, and Alturas, Eagle Lake and Surprise Field Offices. A relatively small area of restoration would take place on the Klamath National Forest and very small amounts of restoration would take place on the Shasta-Trinity National Forest and Redding Field Office.

For the first decade, the annual restoration rate would be approximately 50 percent of each restoration method in the Proposed Action. Total area of restoration would be approximately 15,000 acres per year for the first decade. For the second decade, it is assumed that the restoration rate for mechanical methods would equal the Proposed Action, but that the fire use rate would remain at half. The second decade restoration rate would be approximately 19,000 acres per year. Beyond the second decade, the rate of restoration would equal that of the Proposed Action of approximately 30,000 acres per year. This buildup in restoration rates assumes that monitoring has validated implementation of the restoration methods. In 40 years fewer acres would be restored as compared to the Proposed Action. An additional 10 years, or 50 years in total, would be required to complete restoration in all of the Focus Area under this alternative. It is expected that this approach would create greater certainty regarding the results over time. Alternative C would defer a more aggressive restoration rate until such a time as monitoring validates the increased rate.

Alternative D

Theme – Alternative D emphasizes restoration methods to retain the sagebrush component, have lower risks of invasive species spread due to less area restored with fire, and potentially require less agency resources to implement. This alternative reduces the amount of fire use (from 78 percent to 56 percent) and increases the amount of mechanical restoration (from 19 percent to 41 percent) as compared to the Proposed Action. The majority of restoration treatments would take place on the Modoc National Forest, and Alturas, Eagle Lake and Surprise Field Offices. A relatively small area of restoration would take place on the Klamath National Forest and very

small amounts of restoration would take place on the Shasta-Trinity National Forest and Redding Field Office.

There are a number of Significant Issues, which include concerns that fire use would not achieve resource and restoration objectives with acceptable results. This alternative reduces the area of fire use and increases the area of mechanical restoration as compared to the Proposed Action. Alternative D restores 28,000 acres per year for the first two decades. The restoration rate then increases to 34,000 acres per year for the third and fourth decades. The differences in the restoration rates is a result of deferring critical sage-grouse, mule deer and pronghorn antelope habitat from restoration with fire use for the first two decades. Alternative D would take approximately 40 years to restore all of the Focus Area. The overall extent of restoration of the Focus Area in the Proposed Action would be similar for this alternative. However, some of the restoration areas that would be burned in the Proposed Action would be mechanically restored in this alternative.

This alternative would also incorporate the Monitoring and Adjustment Approach described in Alternative B. It would not, however, include the reduction in restoration rate specified in Alternative C.

Alternative E

Theme – Alternative E differs from the Proposed Action by increasing the restoration rate in order to more fully respond to the purpose and need. This alternative would target mechanical treatment at nearly double the restoration rate of the Proposed Action. Alternative E, similar to Alternative D, would emphasize mechanical restoration methods and less extensive use of fire treatments. Mechanical restoration would retain the sagebrush component. This would have a lower risk of invasive species spread, and would potentially require fewer agency resources to implement.

Overall, this alternative would increase the annual restoration rate over all other alternatives. This alternative would reduce the area of fire use for restoration (from 78 percent to 56 percent) and increase the amount of mechanical restoration (from 19 percent to 41 percent) compared to the Proposed Action. The majority of restoration treatments would take place on the Modoc National Forest, and Alturas, Eagle Lake and Surprise Field Offices. A relatively small area of restoration would take place on the Klamath National Forest and very small amounts of restoration would take place on the Shasta-Trinity National Forest and Redding Field Office.

This alternative would restore 37,000 acres per year for the first two decades, then the restoration rate would increase to approximately 42,000 acres per year for the third decade. The mechanical restoration would be completed by the end of the third decade. About 24,000 acres per year of fire use restoration would continue for three years into the fourth decade. The primary reason that fire use continues after the mechanical restoration would be completed is to decrease the potential for air quality impacts. The other differences in the restoration rates is a result of deferring critical sage-grouse, mule deer and pronghorn antelope habitat from restoration with

fire use for the first two decades. Alternative E would take approximately 33 years to restore all of the Focus Area.

This alternative would also incorporate the Monitoring and Adjustment Approach described in Alternative B. It is anticipated that this monitoring will validate the aggressive restoration rate.

Alternative J (Preferred Alternative)

Theme – Alternative J (Preferred Alternative) would proceed more slowly and cautiously with restoration activity than the Proposed Action, similar to Alternative C. As in all alternatives, a Monitoring and Adjustment Approach would be used to test the effectiveness of different restoration methods and associated vegetative response. Based upon this monitoring, the pace and methods of restoration would be adjusted as appropriate before increasing the restoration rate to match Alternative D. Alternative J (Preferred Alternative) would use restoration methods to retain the sagebrush component, have lower risks of invasive species spread due to less area restored with fire, and potentially require less agency resources to implement, similar to Alternative D.

Similar to Alternative D and E, this alternative reduces the area of fire use and increases the area of mechanical restoration as compared to the Proposed Action. This shift in restoration treatments addresses a number of Significant Issues, which include concerns that fire use would not achieve resource and restoration objectives with acceptable results.

Alternative J (Preferred Alternative) would restore about 14,000 to 21,000 acres annually for the first two decades, fewer than Alternative B (Proposed Action) because some of the Focus Area within critical sage-grouse, mule deer and pronghorn antelope habitat would be deferred until the third and fourth decades. The restoration methods and Focus Area would be the same as those for Alternatives D and E.

The approach to restoration in Alternative J (Preferred Alternative) would include systematic monitoring of results. Based upon the monitoring, adjustments would be made to the restoration methods, and future restoration projects would reflect those adjustments.

For the first decade, the annual restoration rate would be approximately 50 percent of each restoration method in Alternative D. Total area of restoration would be approximately 14,000 acres per year for the first decade. For the second decade, it is assumed that the restoration rate for mechanical methods would equal Alternative D, but that the fire use rate would remain at half. The second decade restoration rate would be approximately 21,000 acres per year. Beyond the second decade, the rate of restoration would equal that of Alternative D of approximately 34,000 acres per year. This buildup in restoration rates assumes that monitoring has validated implementation of the restoration methods. In 40 years fewer acres would be restored as compared to the Proposed Action and Alternative D. An additional seven years, or 47 years in total, would be required to complete restoration in all of the Focus Area under Alternative J (Preferred Alternative). It is expected that this approach would create greater certainty regarding the results over time. Alternative J (Preferred Alternative) would defer a more aggressive restoration rate until such a time as monitoring validates the increased rate.

Treatment types and acres of restoration by alternative are shown in Table 1.

Table 1. Acres of FS and BLM Restoration Treatments by Alternative

	Alternative A	Alternative B	Alternative C	Alternatives D, E and J
Mechanical Restoration[1]				
Dense Juniper Areas	32,500 acres	163,700 acres	163,700 acres	163,700 acres
Less Dense Juniper Areas	0 acres	0 acres	0 acres	272,600 acres
Isolated Juniper Areas	16,000 acres	79,000 acres	79,000 acres	79,000 acres
Total Mechanical	48,500 acres	242,700 acres	242,700 acres	515,300 acres
Fire Use[2]				
Inside Wildland Urban Interface (WUI)	16,000 acres	80,100 acres	59,200 acres	34,200 acres
Inside WUI deferred	0 acres	0 acres	20,900 acres	13,700 acres
Outside WUI	177,500 acres	891,600 acres	749,100 acres	540,400 acres
Outside WUI deferred	0 acres	0 acres	142,500 acres	108,900 acres
Total Fire Use	193,500 acres	971,700 acres	971,700 acres	697,200 acres
Hand Treatment[3]	8,000 acres	39,800 acres	39,800 acres	39,800 acres
Total Treatment Acres	250,000 acres	1,254,200 acres	1,254,200 acres	1,252,300 acres

[1]Mechanical Restoration areas have the following characteristics:
≤30% slope
Dense juniper areas have >20% canopy closure and are ≤1 mile from existing roads
Less dense juniper areas have 6-20% canopy closure and are ≤1 mile from existing roads
Isolated juniper areas have >20% canopy closure and are greater than 1 mile from existing roads

[2]Fire Use Restoration areas have the following characteristics:
≤20% juniper canopy closure
WUI – Wildland Urban Interface areas
Deferred – special wildlife areas that are deferred from fire use for the first 20 years

[3]Hand Treatments areas have the following characteristics:
>20% juniper canopy closure and >30% slope
Hand treatments are associated with resources such as;
Within 100 feet of seasonal drainages
Cultural/Archaeological sites if compatible with values present
Sensitive habitats

Decision Framework

The lead agencies are the FS, Modoc National Forest and the BLM, Alturas Field Office. Modoc County is a cooperating agency. Partner agencies include Siskiyou and Lassen Counties, California. The responsible officials for this planning effort are the Modoc National Forest,

Forest Supervisor and Alturas Field Office, Field Manager. The responsible officials will use the information from this EIS to guide their decision-making and to coordinate treatment projects across ownerships, as appropriate. As appropriate, this information may also be used to amend, revise, or inform their resource management plans. If utilized to amend the Modoc National Forest Land and Resource Management Plan, this would be a non-significant plan amendment (USDA Forest Service 2008a). Decisions related to this EIS are programmatic and strategic in nature and do not require implementation of projects. Specific decisions to be made, in addition to adoption of a Sage Steppe Ecosystem Restoration Strategy, may include:

Bureau of Land Management

The BLM may amend its respective Resource Management Plans to include components developed in this analysis, including but not limited to:

- Desired Future Conditions
- Design Standards to be incorporated
- Monitoring and Adjustment Approach

US Forest Service

Information from the EIS may be utilized to amend or revise the Modoc National Forest Land and Resource Management Plan, including some or all of the following:

- Desired Future Conditions
- Design Standards to be incorporated
- Monitoring and Adjustment Approach

Major Conclusions

The major conclusions are the results of the environmental consequences. These are summarized in Table 2, which displays the key results of the analysis.

Table 2. Summary Comparisons of Resource Effects by Alternative

Environmental Component	Evaluation Criteria	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative J
Reduction in fire hazard level	Focus Area moved towards Condition Class I	5%	24%	24%	17%	17%	17%
Short term effect on forage base for domesticated animals	Trend in range quality	Minor changes	Reduction	Reduction	Reduction	Reduction	Reduction
Long term effect on forage base for domesticated animals	Trend in range quality	Minor positive trend	Long term improvement	Long term improvement, 2nd lowest rate	Long term improvement, 2nd highest rate	Long term improvement, highest rate	Long term improvement, 2nd lowest rate
Watershed	Trend in overall watershed function	Positive, smallest increase	Positive, 2nd highest	Positive, 2nd smallest	Positive, 2nd highest	Very Positive, highest	Positive, 3rd smallest
Wildlife – Mule Deer	Short and long term population trend	Short Term Low intensity, positive trend Long term Moderate intensity, negative trend	Short Term Low intensity, positive trend Long term High intensity, Postive trend	Short Term Low intensity, positive trend Long term High intensity, Postive trend	Short Term Low intensity, positive trend Long term Moderate intensity, Postive trend	Short Term Moderate intensity, positive trend Long term Moderate intensity, Postive trend	Short Term Low intensity, positive trend Long term Moderate intensity, Postive trend
Wildlife – Pronghorn	Short and long term population trend	Short Term Low intensity, positive trend Long term Moderate intensity, negative trend	Short Term Low intensity, positive trend Long term High intensity, Postive trend	Short Term Lowintensity, positive trend Long term High intensity, Postive trend	Short Term Low intensity, positive trend Long term High intensity, Postive trend	Short Term Moderate intensity, positive trend Long term Moderate intensity, Postive trend	Short Term Low intensity, positive trend Long term Moderate intensity, Postive trend

Table 2. Summary Comparisons of Resource Effects by Alternative (continued)

Environmental Component	Evaluation Criteria	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative J
Visuals – Short term significant adverse effects due to Mechanical and Fire restoration	Percentage of area in Retention or Preservation VQOs (USFS) or Class I and II VRMs (BLM) treated per decade	Negligible	"High" probability VQO Treatments 2.6% VRM Treatments 10.6%	"Moderate" probability VQO Treatments 2.0% VRM Treatments 8.5%	"High" probability VQO Treatments 2.5% VRM Treatments 10.6%	"High" probability VQO Treatments 3.1% VRM Treatments 12.8%	"Moderate" probability VQO Treatments 2.2% VRM Treatments 9.0%
Visuals – long term effect	Trend	Neutral	Neutral to Positive	Neutral to Positive	Neutral to Positive	Neutral to Positive	Neutral to Positive
Recreation – Short term effects	Comparison of intensity of shift from Semi-Primitive Motorized to Roaded Natural	Minor, temporary shift	Temporary shift of areas from Semi-Primitive Motorized to Roaded Natural	Temporary shift of areas from Semi-Primitive Motorized to Roaded Natural but lower intensity than Alternative B due to slower Restoration Rate	Temporary shift from Semi-Primitive Motorized to Roaded Natural, greater reduction in Semi-Primitive Motorized than Alts. B & C due to mechanical restoration	Temporary shift from Semi-Primitive Motorized to Roaded Natural, greater reduction in Semi-Primitive Motorized than Alts .B & C due to mechanical restoration.	Temporary shift from Semi-Primitive Motorized to Roaded Natural, greater reduction in Semi-Primitive Motorized than Alts. B & C due to mechanical restoration
Recreation – Long term effects	Improvement in Mule deer habitat could lead to increase in number of deer tags issued	"Moderarte" Decline in Habitat	"High" Improvement in Habitat	"High " Improvement in Habitat	"Moderate" Improvement in Habitat	"Moderate" Improvement in Habitat	"Moderate" Improvement in Habitat

Letters of Support
Alturas District Heating

These excerpts from the attached Letters of Support provide perspectives:

From Land Management Agencies

"I believe this project is **an important first step in establishing local biomass energy production, which in turn, will support Modoc National Forest's Sage Steppe and Forest Health Initiatives.**
One of the buildings to be evaluated is currently under construction and will, in the future**, house the Modoc National Forest Supervisor's Office and other federal agencies." ..**Modoc Forest Supervisor

"A local biomass facility would serve as a market endpoint for excess juniper while providing and economic benefit to the community. **In turn, the value of juniper biomass would increase which would lead to reduce sage steppe treatment costs.** "---Bureau of Land Management

From Local Business

"If the heating district becomes a reality and is fully implemented, **the benefits into the local economy appear unlimited**"….Baird, owner, GSA Complex

"…it is unlikely that the Sierra Nevada Conservancy will see another project that **could take a small amount of grant money and leverage it into so many positive possibilities**." –owner, Niles Hotel, Subway, Modoc Steel and Supply

From the County of Modoc

"Increasing the value of wood chips (is)……**the key element in allowing the Sage Steppe Strategy to achieve its stated goals of restoring forest and land health**"……Chair, Modoc Board of Supervisors

"……the LUC recognizes that the days of funding land health treatments strictly with appropriated dollars is coming to an end**. It will be necessary to increase the value of the biomass waste stream in order to help pay for the treatments."** ….Modoc County Land Use Committee

"…the MTA expresses its keen interest to work with the City and to become a future customer of the proposed biomass-based heating district,"….Executive Director, Modoc Transportation Agency

From Regional Partners

"The Watershed Center is committed **to support and contribute to the strategy outlined** in the grant application to make the Alturas District Heating System a reality." ----Watershed Center in-kind commitment.

Modoc National Forest
Modoc Area BLM
Local business- Baird
Local business-Niles Hotel
County of Modoc
Modoc Land Use Committee
Modoc Transportation Agency
The Watershed Center

United States Department of Agriculture **Forest Service** **Modoc National Forest**
800 West 12th Street
Alturas, CA 96101
(530) 233-5811
TTY (530) 233-8708

File Code: 1560
Date: January 17, 2012

Chester Robertson
Director of Public Works
City of Alturas
200 W North Street
Alturas , CA 96101

Dear Mr. Robertson:

I am writing this letter in support of the ***Pre-engineering Study: City of Alturas biomass–based district heating in support of the Forest Health Sage Steppe Project***. I believe this project is an important first step in establishing local biomass energy production, which in turn, will support Modoc National Forest's Sage Steppe and Forest Health Initiatives. Changing land use patterns since the 1860's have resulted in large increases in the densities of western juniper on the Modoc National Forest, often to the detriment of existing plant and animal communities. Establishment of an economically-viable, beneficial use for biomass, from juniper and cull timber, would lower the cost of treatments to restore sage-steppe ecosystems and improve forest health on the Modoc National Forest and adjacent lands.

The proposed pre-engineering study will evaluate the feasibility of a municipal system that will take advantage of a variety of resources including biomass, existing geothermal wells and existing distribution lines, to provide heat to twenty public buildings and additional private buildings in the proposed heating district. One of the buildings to be evaluated is currently under construction and will, in the future, house the Modoc National Forest Supervisor's Office and other federal agencies.

I believe the project has the potential not only to identify innovative ways of combining existing local resources to provide green energy to local users, but also, by creating a local market for forest biomass products, the project would help restore sage steppe ecosystems, improve forest health, and contribute to the economy of Modoc County.

I am pleased to offer my support as Supervisor of the Modoc National Forest to this worthwhile project. Please feel free to contact me at 530-233-8700 if you have questions.

Sincerely,

/s/ Kimberly H. Anderson
KIMBERLY H. ANDERSON
Forest Supervisor

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Alturas Field Office
708 W. 12th Street
Alturas, CA 96101
www.ca.blm.gov/alturas

In reply refer to:

January 9, 2012

City of Alturas
Chester Robertson, Director of Public Works
200 West North Street
Alturas, CA 96101

Dear Mr. Robertson:

The Alturas Office of the Bureau of Land Management (BLM) supports your grant application with the Sierra Nevada Conservancy for a pre-engineering study of biomass based district heating in Alturas. Development of a local biomass utilization facility is one of the potential side benefits we envisioned during our work on the Sage Steppe Ecosystem Restoration Strategy in partnership with the United States Forest Service and Modoc, Lassen and Siskiyou counties.

As you are aware, the objective of the Strategy is restoration of the Sage Steppe Ecosystem on the Modoc Plateau through removal of encroaching juniper. As the Strategy is implemented, excess juniper becomes an available resource. A local biomass facility would serve as a market endpoint for excess juniper while providing an economic benefit to the community. In turn, the value of juniper biomass would increase which would lead to reduced sage steppe treatment costs. Both the ecosystem and the local economy would tend to benefit.

Good luck with your application.

Sincerely,

Timothy J. Burke
Field Manager

January 18, 2012

Chester Robertson
Director of Public Works
City of Alturas
200 West North Street
Alturas CA 96101

RE: Local Business Support for the Pre-engineering Study for a Biomass-based Heating District for Alturas:

Dear Director Robertson:

As a local business owner, I am in wholehearted support of your application for the Sierra Nevada Conservancy grant funding for the pre-engineering study related to your proposed heating district in Alturas.

This heating district proposal is a project that could have a major beneficial impact for the local economy. The high costs of heating a business in Alturas by electricity and propane take away from investment in business marketing, development and expansion. Jobs will be created and the cost of heating for both private businesses and government buildings should be reduced substantially.

If the heating district becomes a reality and is fully implemented, the benefits into the local economy appear to be unlimited. This is a project that could take a small amount of grant money and leverage it into so many positive possibilities. I strongly encourage the Conservancy's positive consideration of this grant application.

Sincerely,

Robert G. Baird

January 18, 2012

Chester Robertson
Director of Public Works
City of Alturas
200 West North Street
Alturas CA 96101

RE: Local Business Support for the Pre-engineering Study for a Biomass-based Heating District for Alturas:

Dear Director Robertson:

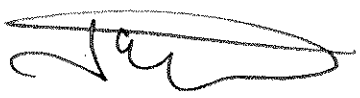
As the owner of the historic Niles Hotel, Modoc Steel & Supply and Subway, I am in wholehearted support of your application for the Sierra Nevada Conservancy grant funding for the pre-engineering study related to your proposed heating district in Alturas. Without question, this heating district proposal is a project that could have a major beneficial impact for the local economy.

Most of the buildings in Alturas, including the Niles Hotel, are older buildings that are difficult to heat. The high costs of heating businesses in Alturas by electricity and propane reduce profit and greatly impact the investment in local business marketing, development and expansion.

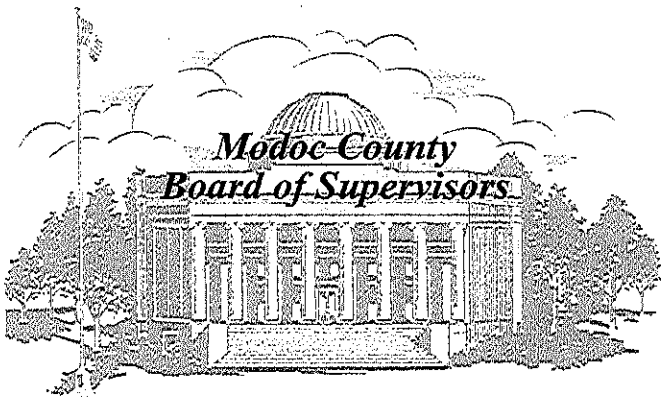
I also sit on the Board of Directors for the Alliance for Workforce Development (AFWD). If the heating district becomes a reality and is fully implemented, the benefits into the local economy appear to be unlimited. Jobs will be created and the cost of heating for both private businesses and government buildings should be reduced substantially.

I think it is unlikely that the Sierra Nevada Conservancy will see another project that could take a small amount of grant money and leverage it into so many positive possibilities. I strongly encourage the Conservancy's positive consideration of this grant application.

Sincerely,



Jim Cavasso



STEPHANIE WELLEMEYER
CLERK OF THE
BOARD OF SUPERVISORS

204 S. COURT STREET
ALTURAS, CALIFORNIA 96101

(530) 233-6201
FAX (530) 233-2434

January 10, 2012

Chester Robertson
Public Works Director
City of Alturas
200 West North Street
Alturas CA 96101

RE: Support for Sierra Nevada Conservancy Grant Application

Dear Chester:

The Modoc County Board of Supervisors (County) is pleased to issue this letter of support for the Sierra Nevada Conservancy grant application from the City of Alturas' proposal for a pre-engineering study of a biomass-based heating district.

The County, along with the Modoc National Forest and the BLM Alturas Field Office, partnered in the development of the Sage Steppe Ecosystem Restoration Strategy (Strategy). The Strategy laid out a forty year plan for treating over a million acres of juniper encroached Sage Steppe landscape, primarily in Modoc County.

However it was recognized that the Strategy could only be successful in the long run if the value of the woody biomass being created by the restoration treatment was enough to help supplement the federally appropriated dollars funding the projects. Given the long haul distance to the existing biomass power plants and the high cost of diesel fuel, the Strategy described the ideal situation as being the construction of a new biomass consuming facility located near the geographical center of the Strategy planning area.

The City of Alturas' proposed heating district is exactly what the Strategy envisioned. By increasing the value of the wood chips, the cost of the treatments decline and additional acres can be treated and restored. This key element will allow the Strategy to achieve its stated goals of restoring forest and land health, providing economic development and lessening dependency on foreign energy.

The County is also encouraged by the role the heating district can play in improving the economic health in Alturas. When implemented, this project should provide a welcome shot in the arm for the business community as both current and prospective business owners tell us the biggest obstacle to a profitable operation is the exceptionally high cost of heating.

In summary, the County believes this proposal both fulfills both the objective of the grant funding and the mission of the Sierra Nevada Conservancy and strongly encourages its successful funding.

Sincerely,

Jeffrey Bullock, Chairman
Modoc County Board of Supervisors

MODOC COUNTY LAND USE COMMITTEE
P.O. Box 1692
Alturas, CA 96101

12 January, 2012

City of Alturas
Chester Robertson, Director of Public Works
200 West North Street
Alturas, CA 96101

RE: Support for the Grant Application Regarding an Alturas Heating District

Dear Chester:

The Modoc County Land Use Committee (LUC) is appointed by the Modoc County Board of Supervisors to advise the County on public land related issues. The LUC took action at their meeting on January 11th to strongly support the grant application regarding a pre-engineering study related to the proposal for a biomass-based heating district. The support included urging the Sierra Nevada Conservancy to give significant consideration to funding this unique proposal.

The LUC is the point of contact between the federal land management agencies and the County. Consequently the LUC was heavily involved in the development of the Sage Steppe Ecosystem Restoration Strategy Environmental Impact Statement (EIS). In fact the LUC earned the Secretary of Interior's Conservation Partnership Award for their five years of work in helping bring the EIS to completion.

The LUC interest in the development of the EIS was twofold. First was the recognition that Western Juniper encroachment represented the largest ecological threat to the environment of Modoc County. Secondly was the realization that restoring the threatened Sage Steppe ecosystem had the potential to produce significant economical benefits for the local economy through improved forest and rangeland health and the marketing of woody biomass.

In working with the federal land management agencies, the LUC recognizes that the days of funding land health treatments strictly with federally appropriated dollars is coming to an end. It will be necessary to increase the value of the biomass waste stream in order to help pay for the treatments. The round trip to nearest existing chip market is approximately 200 miles. The haul costs not only preclude generating revenue through the selling of chips, but demand a substantial subsidy in order to cover the treatment costs.

The development of this proposed heating district creates a local market for the chips. The current freight costs can be returned to the land to fund the next round of treatments, not only increasing the acreage treated but creating additional jobs as well.

The LUC believes this proposal fits especially well into the forest health category of the Sierra Nevada Conservancy's current round of grant funding and we strongly urge this proposal receive the requested dollars.

Sincerely,

Sean Curtis
Chairman
Modoc County Land Use Committee

Modoc Transportation Agency
111 W. North Street
Alturas, CA 96101

(530) 233-6410 Phone
233-3744 Fax

January 19, 2012

Chester Robertson
Director of Public Works
City of Alturas
200 West North Street
Alturas CA 96101

Subject: **Support for Sierra Nevada Conservancy Grant Application for Pre-Engineering Study for Biomass-based Heating District within the City of Alturas**

Dear Mr. Robertson:

The Modoc Transportation Agency (MTA or Agency) supports your application for Sierra Nevada Conservancy grant funding for a pre-engineering study for the proposed project. As an operator of public rural and intercity bus services, the MTA believes that biomass-based heating district will bring synergistic benefits to our frontier rural community, the environment and the economy.

Last year, the MTA acquired an existing facility in downtown Alturas on Main Street (US 395), which is heated using a combination of several wood stoves and centralized diesel furnace. As you know, the Agency is undertaking various remodeling and renovation efforts to enhance the facility, which will include an improved and efficient heating system. As such, the MTA expresses its keen interest to work with the City and to become a future customer of the proposed biomass-based heating district, as soon as it becomes a reality.

The Modoc Transportation Agency strongly recommends that the Conservancy support the effort to fund an initial study to develop a regionally significant project that will surely yield major benefits in our community, local economy and environment.

Sincerely,

Pamela Couch, Executive Director
Modoc Transportation Agency / Sage Stage Bus

The Watershed Research and Training Center

PO Box 356 • Clinic Avenue • Hayfork, Ca. 96041 • (530) 628-4206
Fax (530) 628-5100 • email: wrtc@hayfork.net • www.thewatershedcenter.com

City of Alturas
Chester Robertson
Director of Public Works
200 West North Street
Alturas, CA 96101

January 20, 2012

Dear Chester,

The Watershed Research and Training Center is pleased to offer it's enthusiastic support of the Forest Health Grant Application to the Sierra Nevada Conservancy for the Pre-Engineering Study of a District Heating System for the City of Alturas.

We have taken great satisfaction from working with the Director of Public Works, The County Resources Director, the County Planning Director and others in Modoc County to identify opportunities to strengthen the relationship between the people of Modoc and their resource. The Modoc County team may be small, but it is one of the strongest, productive, biomass working groups we have worked with over the past five years of tackling these issues.

We have worked with many community groups throughout the American west. The usual issue and the first barrier is social agreement. The second is supply. The Sage Steppe process has solved both. The supply issue is now addressed with the 70,000 green tons of Juniper that has been removed annually for the past three years. Modoc County, with no sawmill and no biomass plant, can now begin to build utilization infrastructure ideally suited to benefit the people of the county and ideally support the Forest Health objectives. This opportunity is unique in California.

This project has our support because it is prudent. It reflects a cautious approach. It does not overreach. It can produce results fairly quickly. It is strategic and will "turn the crank" on local markets and local infrastructure. Once the "motor is running", we expect additional strategic uses of woody biomass to develop and the volume and value of local biomass to increase.

The Watershed Center is committed to support and contribute to the strategy outlined in the grant application to make the Alturas District Heating System a reality. To that end, we will commit to providing $5,000 in-kind staff time for project support, public outreach and reporting.

We encourage the SNC team to fully fund this ground-breaking project.

Sincerely,

Jim Jungwirth
Director, Enterprise Development

Attachment C - Members of the Collaborative

Organization Name	*Contact Name*	*Phone Number*	*Role in Collaborative*
BLM - Surprise Field Office (Cedarville, CA)	Allen Bollschweiler & Garth Jeffers	530-279-6101	Implementation & monitoring
BLM-Alturas Field Office (Alturas, CA)	Tim Burke	530-233-4666	Implementation & monitoring
Klamath Basin National Wildlife Refuge (Tulelake, CA)	Ron Cole	530-667-2231	Implementation & monitoring
Modoc County-Resource Analyst (Alturas, CA)	Sean Curtis	530-233-3276	Planning & Coordination
Modoc NF	***Kimberly Anderson***	***530-233-5811***	Integrated in all phases
Modoc Vitality Working Group (Alturas, CA)	Dwight Beeson & James Cavasso	530-233-1999	Advisor for economic stability
NRCS – Alturas Field Office (Alturas, CA)	Matt Drechsel	530-233-4137	Integrated in all phases
NRCS – Tule lake Field Office (Tulelake, CA)	David Ferguson	530-667-4247 x102	Integrated in all phases
Oregon State University (Corvallis, OR)	Dr. Richard Miller	541-737-1622	Advisor -monitoring
Pit River Conservation District (Adin, CA)	Buck Parks	530-299-3178	Integrated in all phases
Pit River Watershed Alliance (Alturas, CA)	Stacey Hafen	530-233-8871	Integrated in all phases

Resource Conservation District – Central Modoc (Alturas, CA)	Kate Hall	530-233-8878	Integrated in all phases
Resource Conservation District –Lava Beds-Butte Valley (Tulelake, CA)	Mike Byrne	530-667-4247x110	Integrated in all phases
The River Center (Alturas, CA)	Valerie Lantz	530-233-5085	Native Grass Seed Collection and education

Long-term Management and Sustainability

The district heating project will be financed for construction through a combination of state and federal grants, private equity, and loans. The City of Alturas Public Works Department will provide long-term management of the district heating system. Heat users will provide revenue for the long-term management and maintenance of the system through the usual fee for services process.

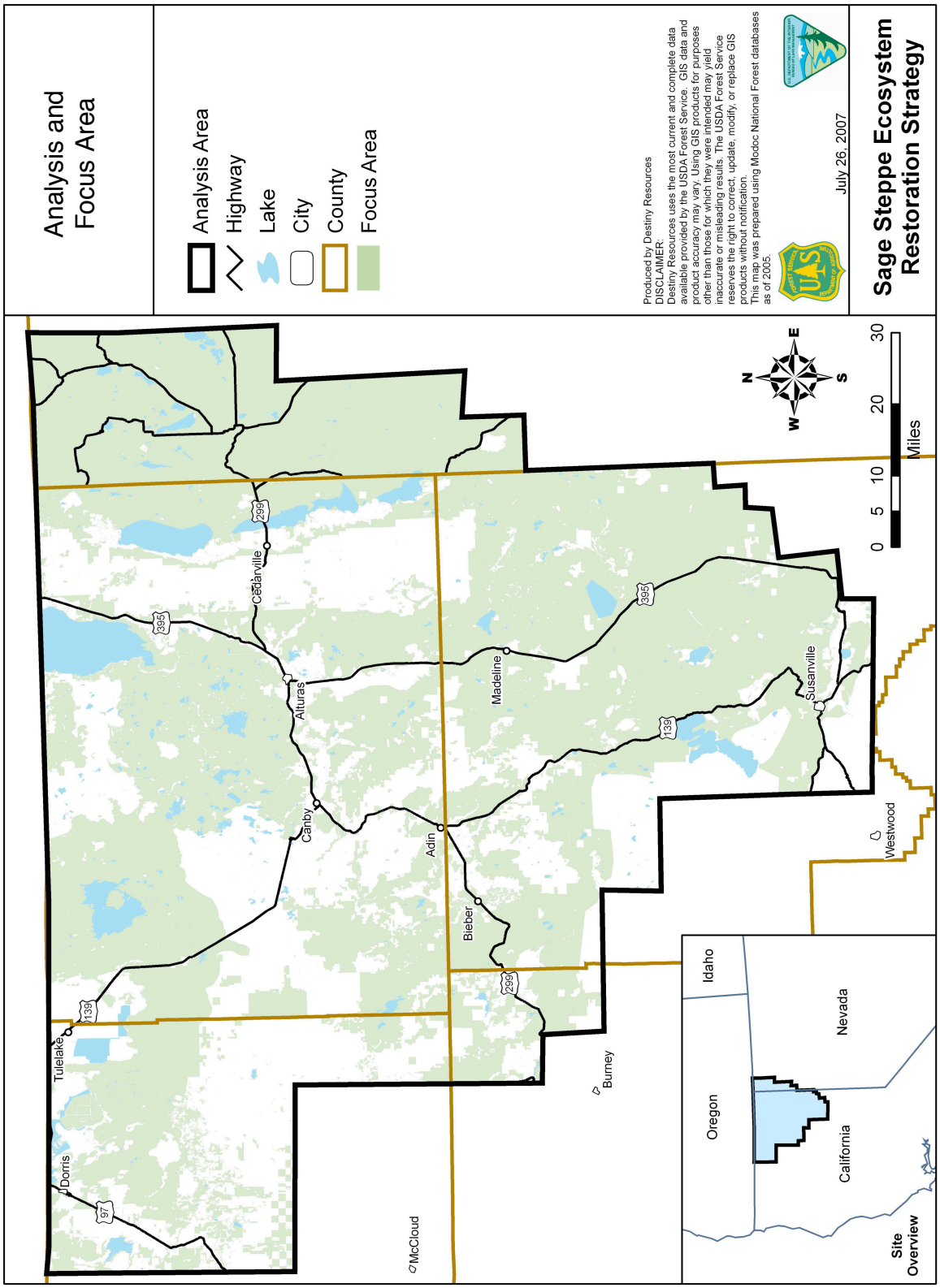


Figure 1. Analysis and Focus Area Location Map

Project Parcel Map

Included below:

Forest Health Ownership Map

Project Parcel Map (arrow pointing to parcel)

Yahoo Map shows vicinity of parcel in Alturas

Alturas Project Parcel Map

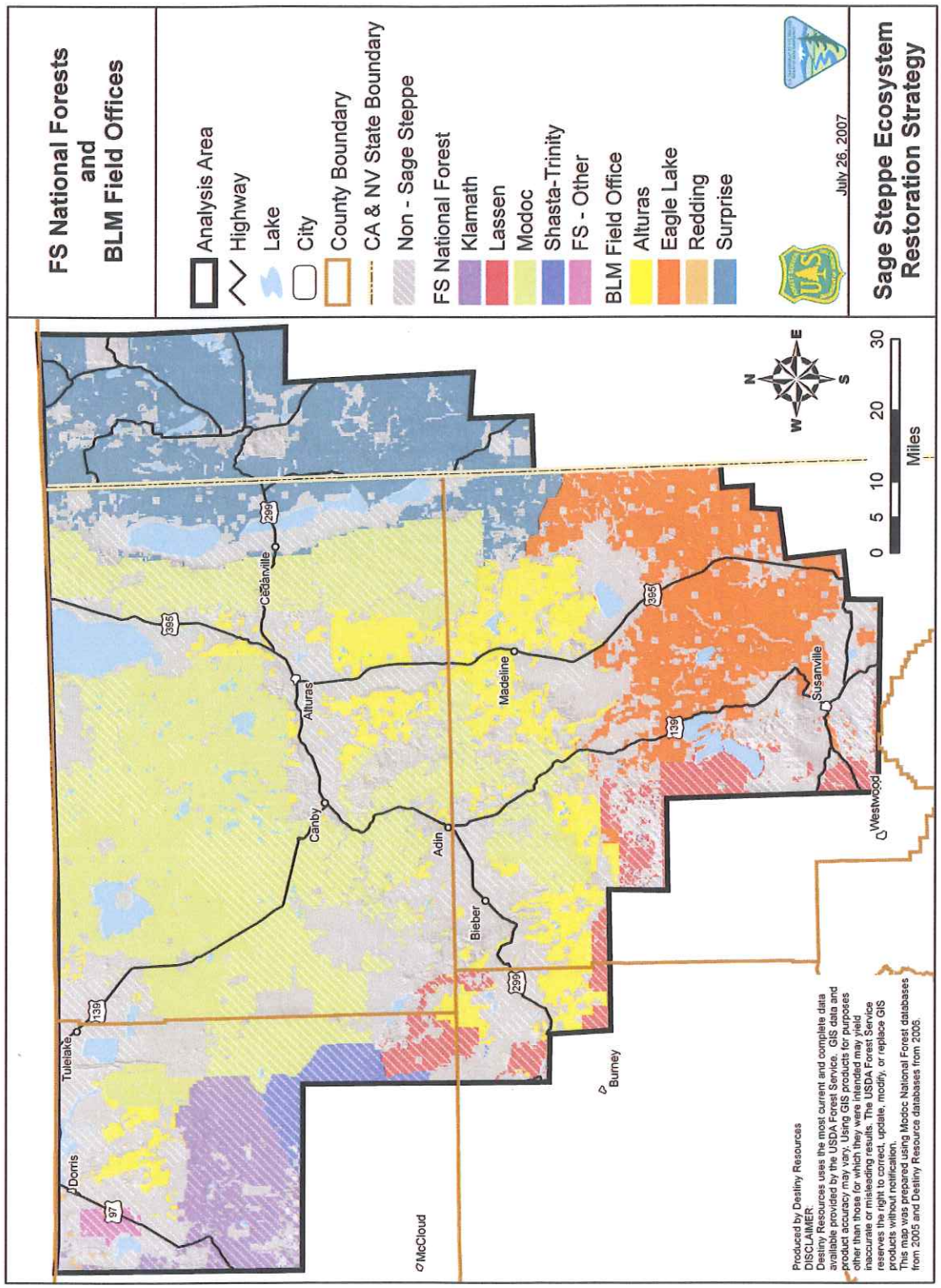
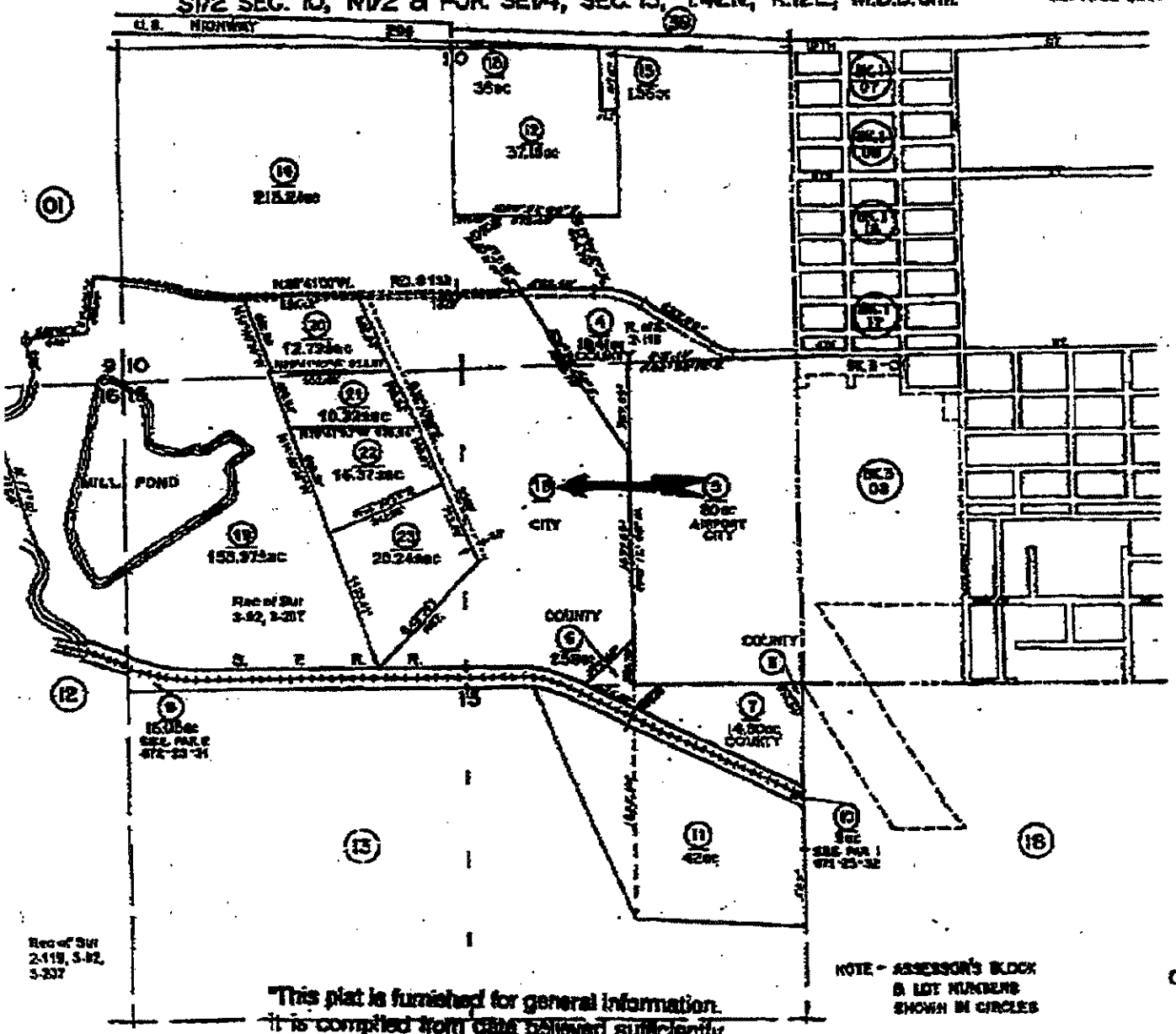


Figure 2. Federal Land Management Agency Lands in the Analysis Area

S1/2 SEC. 10, N1/2 & POR. SE1/4, SEC. 15, T.42N., R.12E., M.D.B.&M. Tax Area Code 57-07 22-49



NOTE - ASSESSOR'S BLOCK & LOT NUMBERS SHOWN IN CIRCLES

Assessor's Map 22-49
County of Modoc, California
May 2004

"This plat is furnished for general information. It is compiled from data believed sufficiently accurate for its purpose, but no liability is assumed or guarantee given by the Company

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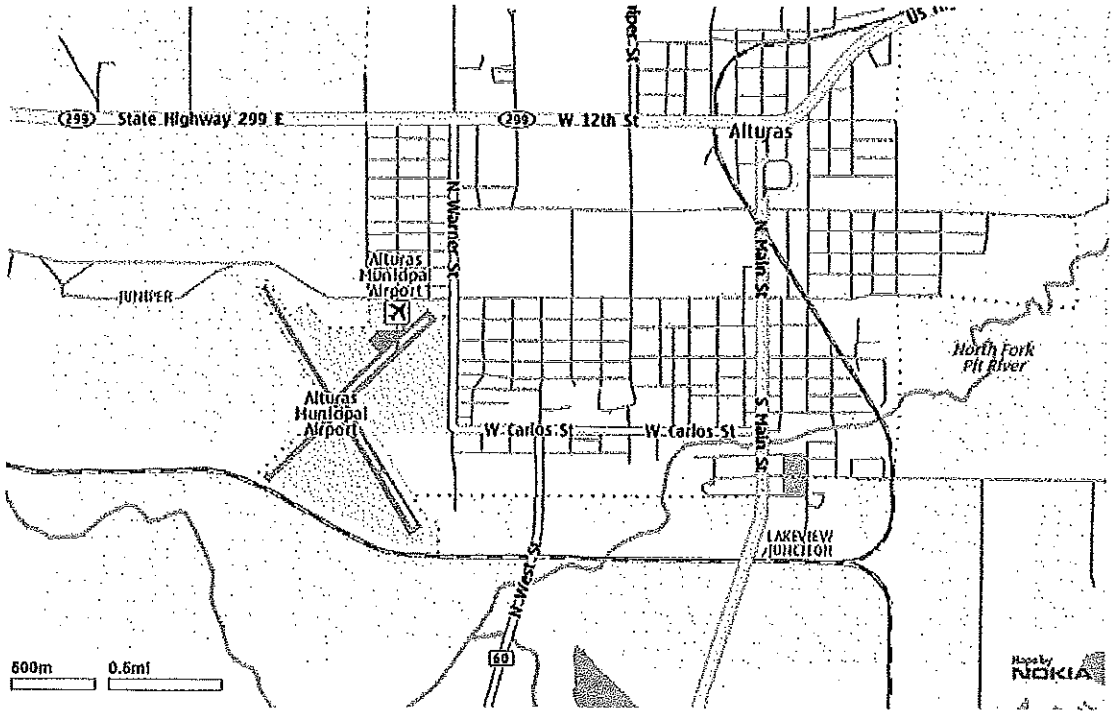
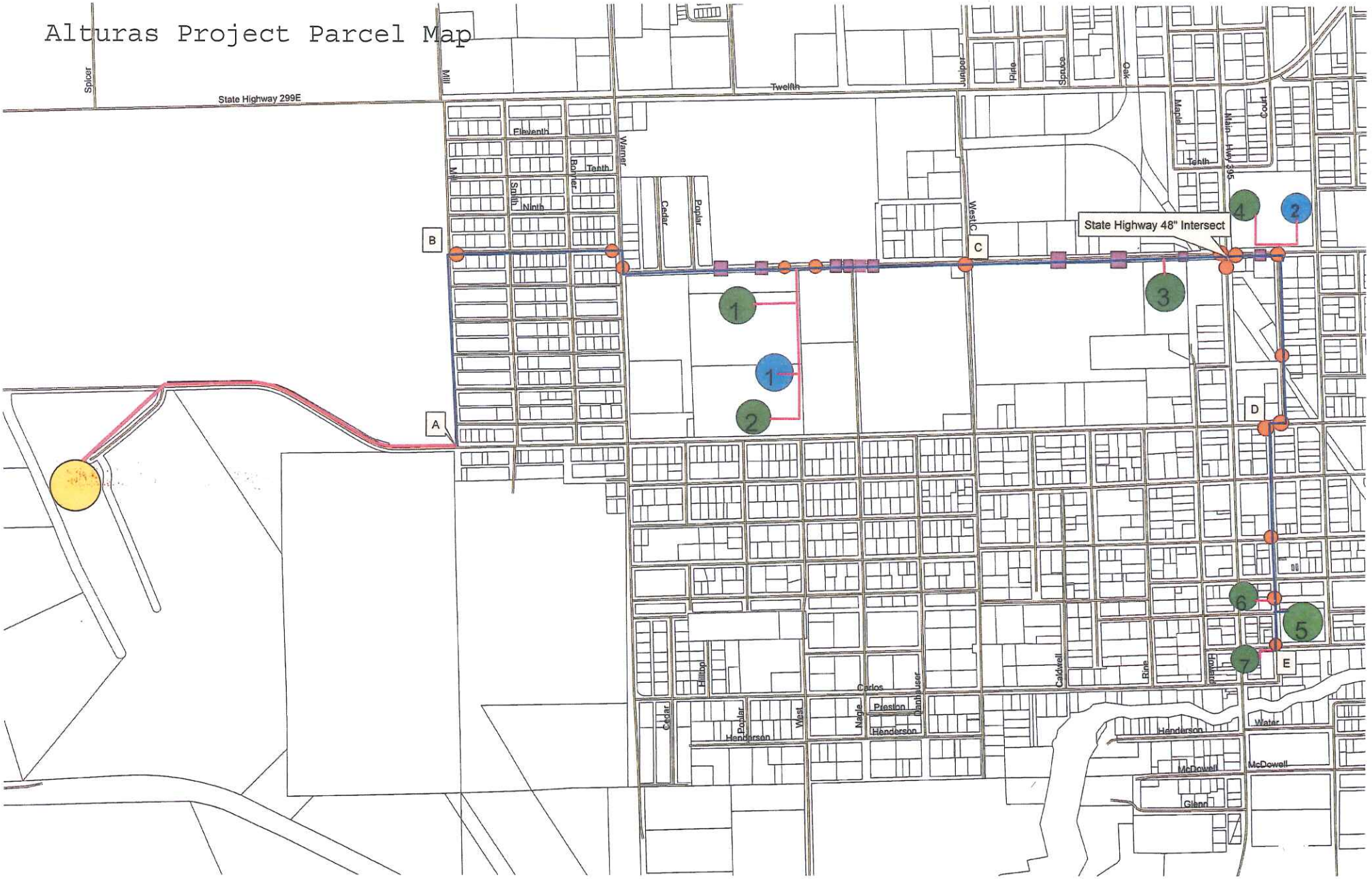
Alturas, CA 96101

Vicinity Map for City of Alturas
Location of Proposed Biomass Based Heating District



Alturas Project Parcel Map

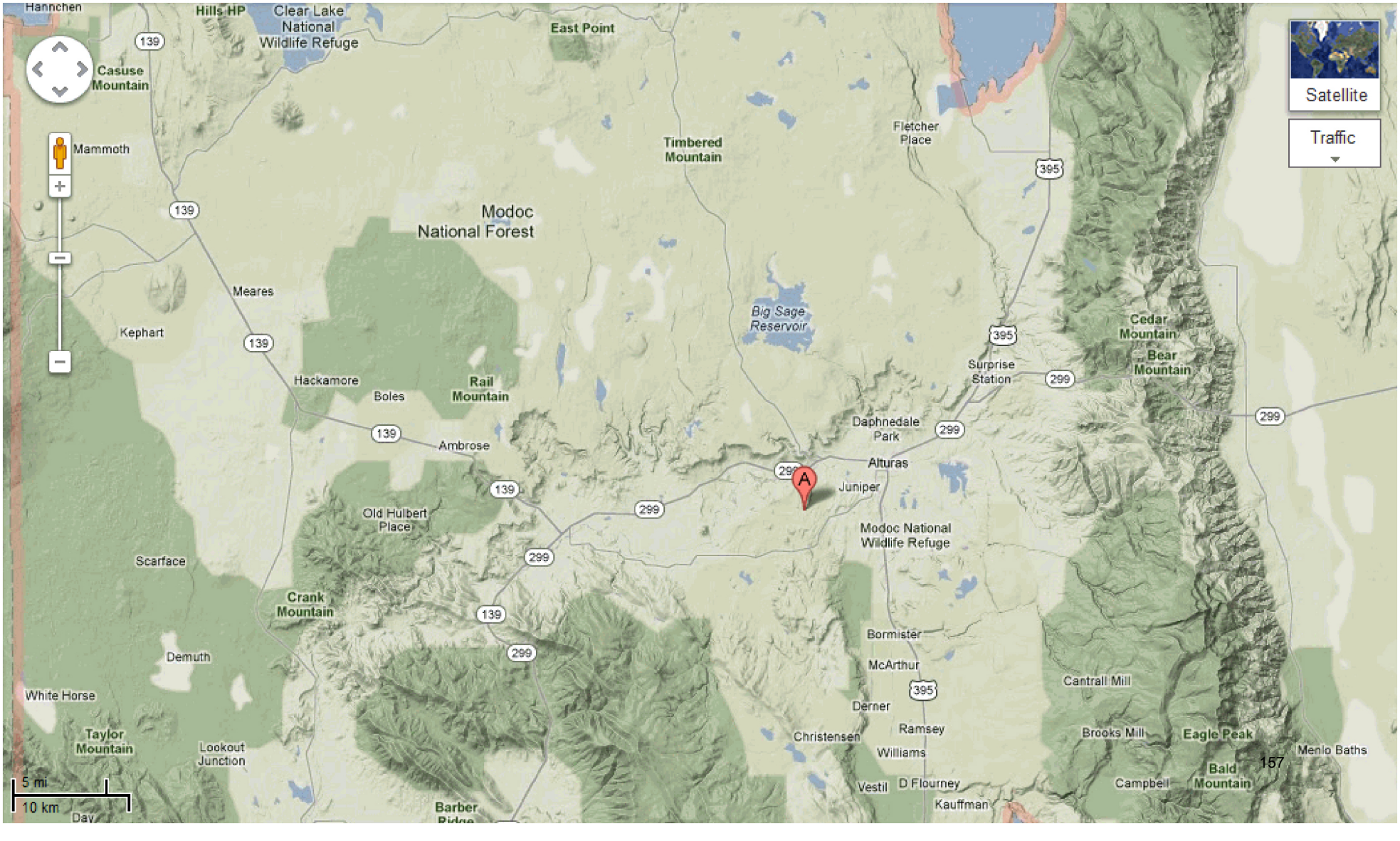


Project Topographic Map

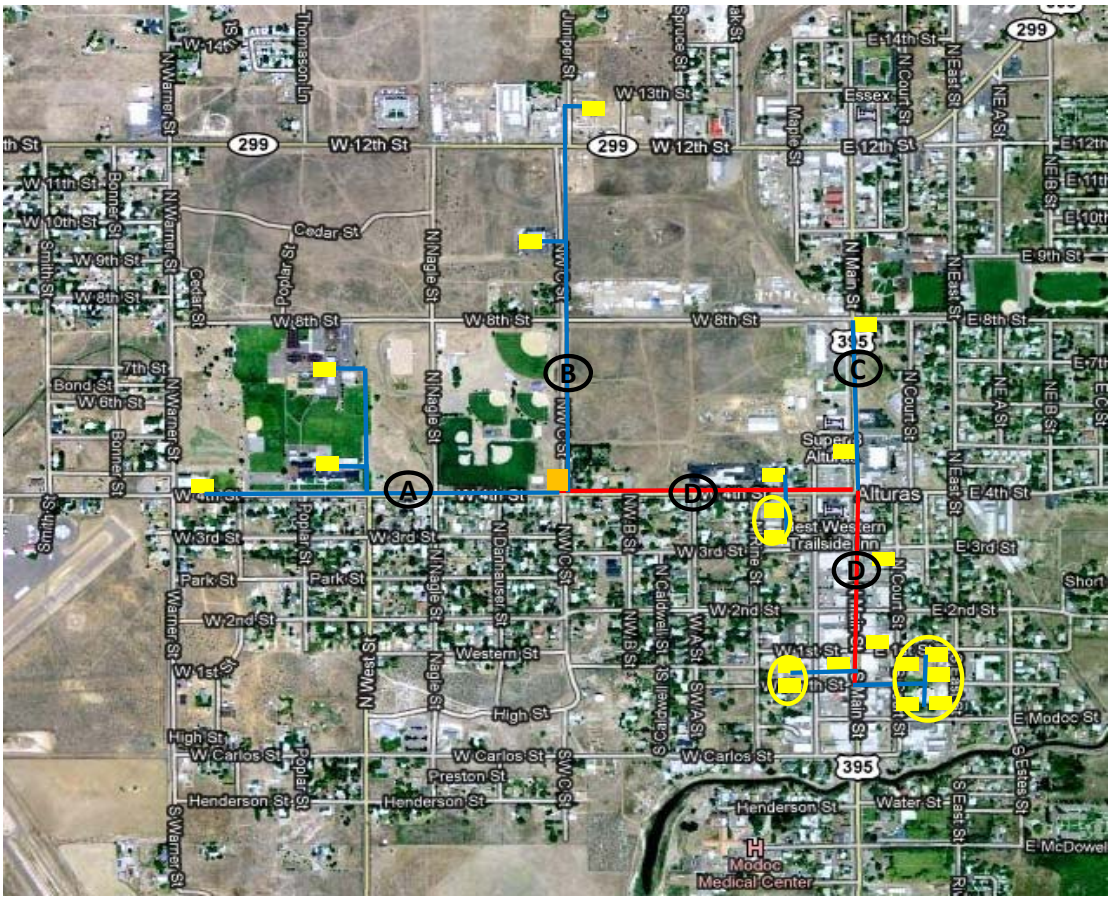
Included below:

Forest Health Topographic Map

Project Topographic Map


Hannchen
Hills HP
Clear Lake National Wildlife Refuge
East Point
Casuse Mountain
Mammoth
Timbered Mountain
Fletcher Place
Modoc National Forest
Meares
Kephart
Big Sage Reservoir
Cedar Mountain
Bear Mountain
Surprise Station
Hackamore
Boles
Rail Mountain
Daphnedale Park
Ambrose
Alturas
Juniper
Old Hulbert Place
Modoc National Wildlife Refuge
Scarface
Crank Mountain
Demuth
Bormister
McArthur
Cantrall Mill
White Horse
Derner
Taylor Mountain
Lookout Junction
Christensen
Ramsey
Williams
Brooks Mill
Eagle Peak
Menlo Baths
Bald Mountain
Campbell
Vestil
D Flourney
Kauffman
Barber Ridge
Day
5 mi
10 km
Satellite
Traffic
139
395
299
157

Project Topographic Map



	Building	SQFT	KW	KW
A	School		700	700
	Swimming Po	1,8 KW per m2 Water surfac		
B	Road Departn	5,000	40	120
	DMV	10,000	80	
C	Public Health	2,500	15	55
	Elks Building	5,000	40	
D	Agricultural D	3,500	25	340
	Library	3,000	20	
	Post Office	5,400	40	
	Social Service	4,000	30	
	City Hall	6,500	55	
	Fire Departme	2,000	10	
	Fire Hall	4,800	40	
	Sheriff Office/	5,000	40	
	Sheriff Annex	1,000	5	
	Justice Center	3,000	20	
	Courthouse	4,500	35	
	County Admir	1,000	5	
	Planning Depa	2,500	15	
	PMR Piping			1,215
	KMR Piping			
	Boiler Plant			
	Heat Client			
	2 or more Buildings on one Block			

Niles Hotel

Alturas Elementary School


Biomass Heating
District Location 2
Page 161


Geothermal Well
Page 162

Ground Breaking USFS Location


Mill Site Location -
Biomass Exchange

Modoc High School

Modoc Middle School


STOP
Modoc Transportation
Agency
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